The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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The Fuel Research Board

WE understand that the Fuel Research Board is now engaged upon the preparation of a third report, which, it is expected, will be issued shortly. A considerable amount of useful preliminary work has been done at the experimental station at East Greenwich, but, as was to be expected in the circumstances of the past year, progress has not been so rapid as many, including the members of the Research Board themselves, desire. The stress of the oil position having passed away with the signing of the Armistice, probably the Board has not been given that priority for material and labour that it would otherwise have had. Still, substantial progress has been made in the past few months, and now a large quantity of the necessary plant is in actual operation. It has to be remembered that what has been erected at East Greenwich is not a laboratory, but a factory—a works for the treatment of coal on a scale of twelve inches to the foot. This sort of thing cannot be rushed to a time schedule in these days, but it has the great advantage that when results are obtained it cannot be argued that they are of no practical importance—that they are mere laboratory results which may mean anything or nothing. Sir George Beilby, the chairman of the Fuel Research Board, is not only a scientist, but a practical man. He has been engaged in the practical distillation of carboniferous mineral for the production of oil during the greater part of a long life, and that experience has no doubt taught him the essential difference between laboratory results and works results. Whatever results from what is now being done at East Greenwich may, therefore, be expected to be definitive upon the particular problems examined.

It has been announced that the Board has been deprived of the services of Professor Thomas Gray by his recall to Glasgow University. This is only partly true. Professor Gray is still giving part of his time to the work at East Greenwich. Considerable comment has also been made on the withdrawal of Professor Bone from the Board. We understand that the simple explanation of Professor Bone's withdrawal is that he preferred to have an entirely free hand in his fuel investigations. As a member of the Fuel Research Board, he might be called upon to sit in judgment on processes that might conceivably clash with his own schemes, and that, of course, would be an impossible position.

Scottish Oil Possibilities

THE paper read by Mr. H. M. Cadell before the last meeting of the Mining Institute of Scotland, on "Scottish Oil Possibilities," holds out but little hope of any augmentation of our fuel supplies from this source. Mr. Cadell speaks not as an oil expert, but as a geological authority, for he was responsible for surveying and mapping, for the first time, the shale-fields of the Lothians in 1884. In his paper, which is reported at length in this issue, he discusses in detail various theories of the origin of mineral oil; but of more direct commercial interest than these are the conclusions to which his inquiries have led. These are frankly against any prospect of finding liquid oil in the shale-fields or carboniferous districts of the Lothians or Fife, and as to other districts, he regards the evidence for oil as no better. In the course of the discussion some criticism was offered of the Government's experimental boring for oil in Scotland, as these appear to have been against the weight of geological opinion. As Mr. Cadell himself put it, it was a great mistake on the part of the Government to lay down new bores before they had ascertained the definite results from any single bore that had yet

pierced the ground. The results of the present experimental bores are expected to be available shortly, and if they show no substantial yield the question, in view of the strong opinion of Scottish geologists, will probably be regarded as settled.

While Mr. Cadell despairs of finding liquid oil in any quantity in the Scottish shale-fields, he points to the peat mosses as an untapped source of oil. Recent investigations, he says, have shown that the deep black peat in some large bogs is, when the water has been eliminated, richer in oil and ammonia than the best oil shales. He estimates that the dry peat, in some cases, can be made to yield more than 26 gallons of oil, and 100 lb. of sulphate of ammonia per ton, and one large bog in Midlothian, he states, has enough nitrogen to provide 180 tons on a practical scale, in addition to the oil and other products. The difficulty, of course, is to eliminate the 80 to 90 per cent. of water in the peat before it can be distilled for oil or ammonia, and this, as Mr. Cadell suggests, seems an appropriate subject for investigation.

Cheaper Nitrate?

We drew attention last week to the reported discovery of Dr. Charme, in connection with the production of a cheaper and purer natural nitrate. The details so far received are too meagre for any very definite opinion to be formed as to the commercial value of the new process, but the method appears to consist of precipitating the nitrate from the raw product by chemical reaction in lieu of the ordinary process of crystallisation. The question of the refinement of the crude caliche certainly grows in importance as time progresses, for some time ago it was stated that the richest beds had been more or less worked out. The caliche, as it occurs naturally, may contain anything between 10 and 80 per cent. of sodium nitrate, the purity of the best quality commercial product ranging around 96 per cent. after treatment. The commoner method of refinement has undergone little change since the industry started, and consists, briefly, in boiling the broken caliche, admixed with water, in iron tanks provided with steam coils. The earthy matter is settled out by gravity, and the mother liquor, containing the sodium nitrate, is run systematically through a series of extraction tanks, afterwards passing into the crystallising pans, where, after some four or five days, the refined nitrate crystallises out, iodine meanwhile being recovered from the mother liquor as a valuable by-product. As against this somewhat laborious process, Dr. Charme proposes in the first instance to do away with the employment of fuel, which in itself is a consideration when it is remembered that about one ton of coal is required at present for every six to eight tons of refined nitrate produced. Moreover, the new process is said to effect a net saving on recovery expenditure of 50 per cent., while it yields a product of 99 per cent. purity. At the same time it would have been as well if the inventor had stated what the remaining one per cent. consists of; for, although quantitatively it is almost negligible, it must be borne in mind that nitrate (particularly the poorer grades) is occasionally found to contain sodium perchlorate, which is decidedly inimicable to plant life. Thus, the new process should be cleared of all suspicion on this count.

Whatever may be the value of Dr. Charme's method, it is at least interesting to observe that, as with so many other processes which have been threatened with extinction by the advancement of science, so with the natural nitrate industry. Accordingly, under the stimulating influence of its synthetic rival, there is every reason to believe that developments in the working-up of caliche will not be long delayed. Moreover, development on the right lines would have a two-fold effect, for in addition to reducing the selling price of the finished product, it should permit of the working of the enormous quantities of inferior material which is now discarded as worthless. Meanwhile, it is noted that, although during the past twelve months there has been a heavy decline in the output of Chilean nitrate, the prospects for the next six months at least appear to be decidedly healthy. It is stated that the total forward sales up to March next amount to probably 1½ million tons, which quantity is not very far short of the total coast stock held at the end of September last. The price for these forward deliveries appears to be 9s. 7d. per quintal, in spite of the fact that the Producers' Association was recently believed to be holding out for something over 10s. The forward selling has been instrumental in prompting the producing concerns to re-open their *oficinas*, more than 50 per cent. of which were recently idle.

How Accidents Happen

Accidents to workmen are always an irritating experience to those in charge of works; but, in spite of all precautions, they inevitably occur from time to time. Chemical works, perhaps, have the advantage over engineering concerns, in that they are never so fully equipped with mechanical plant and running machinery; but any immunity they obtain in this respect is more or less balanced by the nature of the substances which they are handling. It is interesting to note that the attention which has (particularly as a result of the war efforts) been given to the general welfare of employees in industry has led to official inquiries into the cause and prevention of accidents, and the data obtained and tabulated confirm fairly generally the well-founded opinion that accidents can largely be traced to the presence of the "danger-attracting" individual. It is a common experience among employers to find that probably some half-a-dozen of their employees are recurrent units so far as accident is concerned, and when an individual shows himself to be predisposed to "accident-making" he is usually black-listed and dispensed with at the first opportunity. It can scarcely be supposed that a "recurrent" individual is wilfully maiming himself; and, therefore, it can only be surmised that psychologically he differs from the man who goes through his working life with immunity. In many ways it would appear that those who are prone to accidents are abnormally constituted so far as the nervous system is concerned; and, perhaps, the chief drawback of this type is that, as a danger-attracting unit, he may indirectly be instrumental in causing injury to those who would otherwise escape.

With regard to the relation between fatigue and accidents, an exhaustive inquiry held by the Ministry of Munitions indicated that as speed of production increases, so does the tendency towards accident arise; and, as regards hours worked, it was shown that where

women operatives were working a 75-hour week the accidents were two and a half times more numerous than when working a 60-hour week. Moreover, the majority of the accidents occurred during the afternoon hours, at a time when fatigue would be beginning to show itself. In an interesting contribution to a recent issue of the *Times Trade Supplement* a medical writer gives the opinion that in any given establishment there will always be a small percentage of employees who (*a*) are so constituted that the nervous system cannot stand undue pressure or hustle, or (*b*) whose physical health leads rapidly to a state of fatigue, or (*c*) whose careless methods defeat all efforts to control them. From this it may be gathered that administrative reform on the works, if carried to the highest state of efficiency, may certainly prevent the "chance" accidents, but it can never eliminate those due to the idiosyncrasies of the individual. Hence, if the "safety first" aphorism is to be sincerely lived up to, a beginning must be made by finding and eliminating the accident-provoker.

The Fiftieth Whitley Council

THE Joint Industrial Council for the Cement Industry, the first meeting of which was held on Tuesday, was the fiftieth Whitley Council to be formed, and its formation was the occasion of an interesting gathering at the Ministry of Labour. According to Mr. G. J. Wardle, the Parliamentary Secretary to the Ministry, the number of persons represented by the fifty Whitley Councils, and the twenty-four interim industrial reconstruction committees which have been established, exceeds 3,500,000, and if this great army of organised labour and capital can be brought into constant touch and friendly negotiation its influence in the stabilisation of industry must be of great national value. Mr. Wardle, however, uttered one warning. It was against the danger of allowing the Councils to become mere wage boards, and thus encouraging the false idea that wages is the only point in which the worker is interested. There is a much wider field than this open to them, and the wider the outlook of the Councils the wider is likely to be their influence. Mr. Wardle commends to their consideration a group of problems of great human, scientific, and industrial interest—such, for example, as the regularising of production and employment, the improvement of health conditions, the collection of statistics and information on matters appertaining to the industry, the encouragement of the study of processes and design, and of research with a view to perfecting the products of the industry, and inquiries into special problems, including the comparative study of the organisation and methods of industry in this and other countries. On these lines the Councils, instead of being mere cock-pits for fights over wages and hours, would become real Parliaments of Industry.

Trade Returns

ALTHOUGH the effect of the railway strike will be more clearly shown in the Trade Returns for this month, it undoubtedly had some effect on the figures for September. Owing to the completely changed conditions little is to be gathered from a comparison of last month's returns with the figures of the same period last year; but it is unsatisfactory to note that, in spite of an increase of £26,000,000 over September, 1918, there was a decline of over eight millions in the value of exports of British manufactured goods last month as compared with August. Imports, although a little lower than in August, show an increase of £50,000,000 over the corresponding period a year ago. This increase, of course, is chiefly due to the much larger arrivals of foodstuffs and raw materials. Increase in the import of manufactured goods is comparatively small. An increase of £317,000 is shown in the export of chemicals, drugs, dyes, and colours in September, 1918, but compared with August there is a decrease of nearly £400,000. For the first nine months of this year the adverse trade balance amounts to 527 millions sterling.

The following table shows the value of imports and exports for the month, and for the nine months ended September, together with the increases as compared with the corresponding periods of 1918:—

	Sept., 1919.	Increase.
Imports ...	£148,625,074	£50,629,386
Exports ...	66,500,395	26,348,252
Re-exports ...	15,748,911	14,019,683
NINE MONTHS ENDED SEPTEMBER, 1919.		
Imports ...	£1,166,607,457	£197,346,298
Exports ...	541,344,352	167,192,925
Re-exports ...	98,252,708	75,445,678

The Calendar

Oct. 27	Society of Chemical Industry (Newcastle-on-Tyne). "British Association Fuel Economy Committee's Second Report," by Professor W. A. Bone, D.Sc., F.R.S.	Chemical Lecture Theatre, Armstrong College, Newcastle-on-Tyne.
28	Sheffield Association of Metallurgists and Metallurgical Chemists. "Some Microscopical Effects of Static and Dynamic Stresses," by G. R. Bolsover, Assoc. Met.	Royal Victoria Hotel Assembly Room, Sheffield.
28	Manchester Municipal College of Technology. "Site, Lay-out and Construction of Chemical Works," by J. Allan (Joseph Crosfield & Son, Ltd.).	
31	Chemical Industry Club. First Annual Dinner.	Tallow Chandlers' Hall, E.C.
Nov. 1	Institution of Automobile Engineers.	Royal Society of Arts, John Street, Adelphi, W.C.
4	Manchester Municipal College of Technology. "Paint Grinding," by W. H. Barnes (Follows & Bate, Ltd.).	
4	Sheffield Association of Metallurgists and Metallurgical Chemists. "Welding," by H. Brearley.	Royal Victoria Hotel Assembly Room, Sheffield.
5	Society of Public Analysts. "Egyptian Bricks," by G. Rudd Thompson, F.I.C.; "The Analysis of Brazilian Zirconium Ore," by A. R. Powell and W. R. Schoeller, Ph.D.; "The Halogen Absorption of Turpentine," by Ethel M. Taylor.	Burlington House, Piccadilly, W. 1 (in the Rooms of the Chemical Society).
6	Chemical Society. Ordinary Scientific Meeting.	Burlington House, Piccadilly, W. 1.

The Synthesis of Ammonia.—I

With Special Reference to its Present Position in Great Britain

By E. Maxted, Ph.D., B.Sc.

There are few writers in a position to deal with the nitrogen problem more authoritatively than is Dr. Maxted. In this, the first part of a valuable article on the subject, he draws attention to the vague nature of the international position with regard to the Badische patents, and shows that the possibility of having to defend an action for infringement may have deterred those who had contemplated the erection of synthetic plant in this country.

THE industrial synthesis of ammonia is a reaction which during the past decade has deservedly attracted considerable general interest by virtue of its fundamental economic importance, in that it probably constitutes the most promising solution of the nitrogen problem at present known, and, further, by reason of the striking illustration which it affords of the ever-increasing influence which the methods and results of physical chemistry, and especially of thermodynamics, are exerting in predicting and shaping the course of modern chemical industry, even in its relation to national economics.

The factors which have influenced the phenomenal growth of the industry in Germany, compared with its development in this country, are to be found not only in the energy and magnitude of the technical offensive carried out by the Badische Company for the establishment of the reaction there, but also in the peculiar economic position in which Germany has been placed during the period of the war, in that she has been forced to develop to the fullest possible advantage each and every available process for fixing nitrogen in a form capable of being converted into nitric acid for the production of explosives.

From this point of view it should be emphasised that the production under war-time conditions of comparatively large quantities of synthetic ammonia is by no means a guarantee *per se* of the economic success of the industry in normal times in this country, the criteria for this being found rather in an analysis of the energy, capital, and labour factors corresponding to each ton of combined nitrogen than in the mere numerical citation of the tonnage produced during a period of national emergency.

The direct synthesis of ammonia stands, however, in a unique position among nitrogen fixation processes, in that it produces with a comparatively small expenditure of power and labour combined nitrogen in an easily handled non-poisonous form, suitable—at any rate after simple neutralisation—for direct use in agriculture.

On the other hand, the synthesis is by no means easy to operate, and the eventual success or failure of the reaction, as an established industrial process in this country, will undoubtedly depend on the balance of power in this peculiar combination of economic advantages and of technical difficulties in operation.

The history of industrial chemistry furnishes many examples of similar circumstances, which in the absence of technical and manipulative difficulties of a nature incapable of being eliminated by a careful study of the conditions involved in the synthesis—and certainly no such obstacles appear to exist in the case of ammonia—can have only one ending. The successful development of the sulphur trioxide synthesis, also by the Badische Company, may be cited as a typical example of what has taken place in analogous cases, and, while nothing is so dangerous as a positive prediction of success, the ultimate establishment in this country of the production of synthetic ammonia at a cost capable of competing very favourably indeed with all other sources of combined nitrogen, may be regarded as assured.

While it must be confessed that, as far as is known to the author, no really large scale plant for the synthesis of ammonia under commercial conditions has, up to the present, been in operation in this country, a by no means inconsiderable amount of experimental and semi-industrial work has been carried out during the period of the war, both under the direct auspices of the Government and by means of private enterprise. As a result of this, there exist extensive data and experience, which, particularly if pooled, should go far towards the erection of a successfully operated factory without the necessity for recourse to information and experience obtained from outside. The erection of such a factory would undoubtedly have become an accomplished fact had the war continued, particularly since the large expenditure thereby entailed, and the possibility of an initial commercial loss during the adjustment period, might justifiably have been regarded as being warranted by the desirability of supplies of combined nitrogen from a source unaffected by the shipping position.

With the return to peace conditions, the position has become slightly altered. The desirability of abundant supplies of combined nitrogen for agricultural purposes remains undiminished in intensity, but the time factor associated with this has undergone a considerable modification, in that it appears desirable to co-ordinate and systematise all available information and experience, either with or without what may be obtained from German sources, with a view to the erection of plant of maximum efficiency and the avoidance of a period of adjustment, rather than the adoption of a policy under which speed of erection is of even higher importance than the highest possible yields of ammonia at a minimum of cost. This is, of course, an argument which must not be pushed too far.

The present position in this country may, further, be influenced to some degree by the vagueness of the international position respecting the existence of valid master-patents held directly or indirectly by the Badische Company, or which might be assigned by them to a group or firm in this country with resulting complications in the position of other firms who might be engaged in the synthesis. Certainly, as Professor Matignon has recently emphasised, there exist numerous publications relating to work done on the synthesis before the date of the first Badische patent, but the legal position of a firm, which erected and operated a synthetic ammonia plant employing pressure and circulation, with, for instance, iron as a catalyst—all without a licence, compulsory or other—might, while the corresponding patents remain still in force, have to be maintained in the ordinary manner, by successfully defending an action for infringement, should such be at any time brought by the owners of the so-called master patents in question.

Passing from the above views on the present position of the industry to a discussion of the synthesis from a technical aspect, it may be noted that the principal reason for the only recently recognised possibility of the reaction is to be found both in the comparatively small percentage of ammonia formed under atmospheric pressure as well as in the sluggishness with which ammonia formation takes place in the presence of catalysts not specially suited to the

synthesis, the necessary degree of purity from catalyst poisons being far higher than for any other common reaction. It was, indeed, principally on theoretical grounds, by reason of the exothermic nature of ammonia, that Haber and his pupils, as well as Nernst and Jost, undertook the earlier investigations of the ammonia equilibrium, in which figures of the dimensions called for by thermodynamical considerations were only obtained after considerable experimental work.

The use of high pressures, which incidentally forms the subject of a patent application by Le Chatelier as early as 1901, necessarily leads on theoretical grounds both to an increase in the equilibrium percentage, also, in common with its effect on gas reactions generally, whether accompanied by a change in the number of molecules or not, to an increase in the reaction velocity.

While it is not proposed to deal here with theoretical considerations underlying the variation with temperature and pressure of the percentage of ammonia capable of existing in equilibrium with nitrogen and hydrogen, the results obtained, and confirmed also experimentally, are of the dimensions given in the following table :—

TABLE I

Temperature. ° C.	Equilibrium. 1 Atm.	Percentage of Ammonia at 50 Atm.	100 Atm.	200 Atm.
450 ...	0.24 ...	9.5 ...	16.2 ...	25.3
500 ...	0.13 ...	5.7 ...	10.4 ...	17.6
550 ...	0.08 ...	3.7 ...	6.9 ...	12.0
600 ...	0.05 ...	2.3 ...	4.5 ...	8.2

As the synthesis is ordinarily operated, no attempt is made to reach the equilibrium point by allowing the gases to remain for a protracted time in contact with the catalyst, reaction velocity being a factor of equal importance to the actual position of the equilibrium in determining the amount of ammonia formed at the high rates of passage which are found to be conducive to high yields from a furnace of given size. From this point of view it is obvious that a rise in temperature may quite easily lead to an increased production of ammonia in spite of its adverse effect on the equilibrium point.

With regard to the selection of a suitable working pressure, it may easily be deduced from the effect of this factor on the reaction velocity and equilibrium percentage alike, together with the fact that the power required for compression varies as the logarithm of the pressure required, that this should be as high as is compatible with a suitable construction of furnace and circulating system. The technical synthesis, as at present operated, is not ordinarily carried out at a pressure of more than 200 atmospheres—usually at 150 atmospheres—but a recent patent of Claude claims the use of pressures up to no less than 1,000 atmospheres. Whether or not such pressures are capable of serious employment in an industrial plant remains to be seen. Even at 150 atmospheres the difficulties encountered especialy with joints and above all with glands, are by no means of a nature to be treated lightly, but, on the other hand, in view of the engineering advances which Claude has made in other directions, particularly in connection with the liquefaction of gases, this proposal for the employment of still higher pressures may well be treated with the consideration merited by its source.

The methods of preparing catalyst for the synthesis vary widely with the metal employed and, as already mentioned, differ from those employed for most other catalytic reactions by reason of the degree of freedom from catalyst poisons necessary not only for economic success, but even for obtaining ammonia at all.

Traces of sulphur are specially frequent and troublesome, and catalysts of ordinary purity often require quite special treatment before they are capable of giving more than mere traces of ammonia on subjecting the gaseous mixture employed—which mixture itself must also be to a high degree free from catalyst poisons—to the action of the catalyst at the temperature and pressure selected for the synthesis.

A bewilderingly large number of catalysts of varied activity are mentioned in the patent literature of the subject, but in practice iron would seem to be the metal most used, both on account of its cheapness and of the ease with which it can be revivified *in situ*, combined also with the reducible nature of iron oxide and the manner in which the catalytic activity of iron may be raised by the incorporation of so-called promoters such as the alkalies.

In order to free an iron catalyst, of ordinary purity, from the last traces of volatile catalyst poisons, the material may be subjected to alternate oxidation and reduction under such conditions that the mass becomes melted during the treatment, particularly during the oxidation phase. This is effected in practice in a furnace heated directly by oxy-hydrogen flames, which impinge on to the surface of the mass undergoing purification, the atmosphere being made alternately oxidising and reducing by varying the relative proportions of oxygen and hydrogen injected into the furnace. A promoter (usually potash) may be incorporated with the iron before this treatment, but published directions also exist for treating iron in this way in the absence of a promoter, and, in any case, a volatile promoter such as potash is, to a large extent, eliminated, partly by volatilisation at the high temperature employed and partly as slag.

In any case the process of alternate oxidation and reduction is repeated as often as may be necessitated by the degree of impurity originally possessed by the iron, whereupon—the final operation being one of oxidation—the mass is run out or otherwise removed from the furnace, allowed to cool, and broken up into pieces of suitable size for use in the synthesising vessel. The catalyst is, usually after moistening with potash solution, now subjected to a final reduction by means of hydrogen at 550° to 600° C., or ammonia may be employed as a reducing agent, with formation of iron nitride, in which case a higher reduction temperature is admissible without consequent loss in activity by sintering and other changes in the nature of the reduced surface. This final reduction is preferably carried out before introduction into the synthesising chamber on account of the evolution of a considerable quantity of reaction water.

In addition to iron, uranium, particularly as uranium carbide, also osmium, possess an interest from the standpoint of the historical development of the synthesis. Uranium is, however, easily oxidised by even small traces of air or of water vapour in the reacting gases, with consequent suspension of its catalytic activity and for this reason is not very suitable for industrial use under conditions in which the catalyst is required to retain its efficiency for a prolonged period.

Catalytically active uranium is prepared by intimately mixing green uranium oxide with from 7.5 to 11 per cent. of sugar charcoal, the mixture being compressed into a carbon crucible and reduced in an electric furnace. The product contains uranium carbide in quantity varying with the relative proportion of carbon to uranium oxide taken in preparing the original mixture, but the presence of carbide is not deleterious to the activity of the product.

For the preparation of an osmium catalyst, asbestos is soaked in a solution of a soluble osmium salt, which is subsequently reduced to metal, but while, from a technical standpoint, osmium would probably form the most suitable catalyst investigated up to the present, the commercial use of this metal is rendered impossible by its high cost.

Laboratory Tests on Mineral Oils

Proposals for Standardisation

In a paper before the Institution of Petroleum Technologists at the Royal Society of Arts on Tuesday, Mr. Arnold Philip, chief chemist at Portsmouth Dockyard, described a number of laboratory tests on mineral oils. The real subject matter of the paper, however, was the standardisation of tests of oils with a view to eliminating disputes between seller and purchaser owing to the difference in methods adopted by the respective chemists. A proposal to form a Standardisation Committee was made about two years ago, but the Institution has not acted upon it yet, and the author, at the instance of the late Sir Boverton Redwood, presented a description of tests of his own device, which were novel in many cases, with a view to eliciting comments and criticisms which might further the question of arriving at an agreed standard for the technical examination of oils. The original suggestion two years ago was made by Mr. Alexander Duckham in a letter to the Council of the Institution, which was reproduced in the paper, of which the principal point is as follows :—

"My suggestion is that the Institution should appoint a Standardisation Committee whose reference should be to investigate methods of testing [petroleum oils] and to recommend standards for adoption in this country. At present, in even the simple tests, carried out on well-standardised apparatus, there will be found to be variations in results in the hands of different operators, this being due, of course, to small differences in manipulation, which have not been sufficiently detailed in the published instructions as to conduct of the tests. Mr. Lomax [the author of a paper on the subject concerning which the letter was written] has specially instanced the case of distillation. I would draw your attention to such minor tests as melting-points, boiling-points, viscosities, both on account of differences in manipulation, and of radical differences in the methods adopted. Then, again, there are different methods of expressing results: for example, some laboratories will express their viscosity figures on a Redwood instrument in terms of the comparison with rape oil, whilst others give it in the number of seconds. Certain laboratories will report viscosities at 70° F., 140° F., and 200° F., others favouring 60° F., 100° F., and 212° F., and many other variations in these figures. In the determination of the cold-test, of the asphaltic content, of the liability to emulsification, and in the estimation of aromatics, and so on, it is seldom found that the methods of any two laboratories are strictly comparable. I feel that in this short letter I have dealt very inadequately with this most important subject, but I trust that what I have written will show what is in my mind, and that it may be considered of sufficient importance for the Council to decide to take action in the direction I venture to suggest. If such action were taken, I think it would be found advisable that the members of the Committee should be representative not only of the consulting chemist, but also of the works chemist."

Methods of Devising Standard Tests

In supporting the suggestion of the appointment of a Standardisation Committee, Mr. Arnold Philip expressed his own views as to the method to be adopted in devising standard tests. There are (he said) two policies which are advocated in the proposals which have hitherto been made for the standardisation of the conditions under which technical chemical testing is carried out. The first of these was to standardise the method of test upon the lines proposed for petroleum testing by Mr. Duckham. The second policy was to standardise the composition of certain representative samples of each kind of material by means of elaborate check-tests carried out by analysts of acknowledged standing, the method of test employed being left to the choice of the individual analyst. The standard representative samples of material whose composition had been fixed by these tests were then to be available for distribution to chemists for checking their own methods. This latter procedure was that which had been decided upon by the Iron and Steel Institute with reference to the chemical testing of iron and steel, and the necessary investigations are now in process of being carried out.

A method of dealing with standardisation of chemical tests, which might perhaps be described as intermediate between the two above referred to, appeared to have been decided upon by the conference held by the Institute of Chemistry on June 26 last, to consider the advisability of making provision for the preparation and issue of authoritative samples of chemical substances, metals, etc., of ascertained composition. This conference, was attended by representatives of the Chemical Society, the Society of Chemical Industry, the Society of Public Analysts, the Institute of Metals, and the Federal Council for Pure and Applied Chemistry. The conclusions arrived at were that the provision of standard chemical substances was desirable, and that having regard to the fact that such standards could not be provided without reference to methods of analysis, the scheme should not aim at restricting the choice of methods, but always their revision and improvement.

The author, however, was at present hardly prepared definitely to advocate any one of these three policies for the standardisation of chemical testing as applied to mineral oils, but was inclined to consider that for such materials the standardisation of methods as proposed by Mr. Duckham would be found to be necessary, on account of the fact that the large quantity of a sample which was required for a single complete set of tests on an oil must render it practically impossible to preserve standardised samples for issue to analysts generally for carrying out comparative tests under routine conditions. For steels and other metals and alloys, the storage and issue of standardised samples would be comparatively readily arranged. A complete analysis in duplicate of a steel, however complicated its composition might be, could be carried out on a weight of three ounces, whilst for the routine complete test of a mineral oil a sample measuring at least a quart (*i.e.*, about 40 ounces) was required. Moreover, the storage and transmission of samples of oils presented difficulties which did not exist in the case of samples of metals and alloys. One objection to the standardisation of methods of test as opposed to the preparation of samples of standard composition, by means of which samples each analyst can standardise his own method, was more serious than those referred to above, and consisted in the real difficulty which was experienced in describing any method of test in such a way that different operators having different experience in testing would all apply it in the same manner. It was believed that most chemists who had had experience of the difficulties in testing on the large scale had realised that although a method of test used in a given laboratory might as a general rule be carried out in the same manner, yet even under such conditions, with a large staff of analysts, the members of which change from time to time as resignations and fresh appointments took place, a good deal of careful supervision was required in order to secure that the routine of testing was carried out in all its necessary detail, even although full written instructions for the methods were supplied for information. Usually, these must be supplemented by direct verbal instruction.

Portsmouth Methods of Testing

The paper then described methods of testing adopted at Portsmouth. The preparation of representative testing samples of oil, fuels, creosotes, and tars was dealt with briefly. Regarding distillation tests on crude oils, it was pointed out that a method of fractionation should be selected which would give the most uniformly concordant results when the same sample of mixed liquids was submitted to it by repeat tests either by the same or by different operators, one, moreover, which depended as little as possible upon the personal skill and experience of the operator. The method adopted at Portsmouth was described and illustrated, and the results of tests by five different investigators, obtained quite independently, showed a concordance of results which suggested that the author's aim had been achieved. The determination of the calorific value of motor spirit by the bomb calorimeter was next described. If the use of the low or net calorific value was to be retained in the future, the author considers it is desirable, for the sake of uniformity, that it should be calculated in one form only, and the form adopted by Continental writers is considered the most satisfactory for use as being less ambiguous. The author believes that the net or low calorific value should be abolished in future, and that in reporting upon all fuels from the point of view of their heating capabilities only two directly ascertained results should be given These are (1) the high calorific value determined by the bomb calorimeter as now commonly reported, and (2) what the author designates as the "water value"

of the fuel, that is, the total number of units of weight of water obtained from the combustion of unit weight of the fuel, by which is meant the sum of the water derived from the oxidation of the combined hydrogen in unit weight of the fuel, together with the hygroscopic water contained in that weight. From these two values, the calorific value and the water value, any form of the low or net calorific value could be at once determined in any unit desired by the most simple calculation. If this procedure was generally adopted, it would remove any possibility of the ambiguity which at present exists concerning low calorific values. The engineer would be provided with the calorific value of the fuel (high value) and the "water value," both of which are direct determinations, and these would supply him with all the information necessary to make any desired calculation to suit the special conditions of the thermal tests which he was carrying out.

The paper further dealt with the determination of the amount of water in oils, tars, &c., the free acidity of oil fuels, and the effect of moisture in mineral oils upon their flash points, methods being described which have been in use at Portsmouth for some years.

The discussion turned mainly on the question of standardisation.

Discussion

Sir Thomas Holland, who is home on holiday from India, said there were many difficulties to be got over in the matter of standardisation. Vested interests had to be considered, while a great deal could be done by establishing standards consistent with vested interests, if action was postponed in the hope of obtaining perfection later, further vested interests might grow up, which would increase the difficulties. It would be necessary to work in conjunction with other institutions, especially the chemical societies, which had already done a great deal of work upon standardisation. There was also the question of international co-operation, although we should not postpone action until we had got other countries into full co-operation. It might, however, be worth while inviting the co-operation of other petroleum-producing countries, especially America, rather than to take precipitate action on our own account. Before much could be done, however, there was the question of finance to be considered. The Engineering Standards Association had already done a considerable amount of work, and the work of such a Committee as had been proposed would touch on their programme, especially in connection with lubricating oils. They would, therefore, have to consider whether the money for such a Committee should be provided privately or whether it would be fairly chargeable to Government funds. He felt that the first thing to be done was to appoint a preliminary Committee, which would gather together what had already been done and lay down some lines for further action, rather than to appoint the Standardisation Committee at once.

Dr. Dunstan expressed the hope that any Standardisation Committee would take within its programme oils other than petroleum oils. There were cannel oils, low temperature tar oils, and lignites, which were of great importance to this country.

Professor J. S. S. Brame agreed generally with the views of Sir Thomas Holland. We were not producing petroleum in very large quantities in this country, and we could not rank as a first-class oil-producing nation. There were big oil interests in other parts of the world, and he particularly drew attention to what was being done in the direction of standardisation in the United States. They had already gone a considerable distance in this matter, as was shown by a paper by Rickman and Dean, which was published in the Bureau of Mines, Washington, Bulletin 125 of 1916.

Mr. E. L. Lomax welcomed the idea of standardisation as a means of preventing the differences of opinion between buyers and sellers which now arose through the tests not being standardised.

Dr. W. R. Ormandy said that one of the outstanding features of the paper was that the author was very diffident of expressing any definite opinions. From one in Mr. Philip's position they had the right to expect a greater degree of certainty. The paper suggested that it would be necessary for the Institution to extend its scope beyond petroleum, and that should be made clear to intending and possible new members. With the new fuels that would have to be used in the future, such as alcohol-benzol and alcohol-ether, difficulties would arise which would need the consideration of all chemists and those engaged in the oil industry. In Australia plant was being put down to make two million gallons of such fuels per annum, and a large plant was also being installed in India. Therefore the question of the behaviour of such mixed fuels would have to be gone into very carefully, having regard to the fact that alcohol could be mixed with water and used in a potable form. It would be necessary jointly to arrive at methods which would get over these difficulties.

Mr. Arnold Philip briefly replied to the discussion, but will send in a full reply in writing. He said that he only described his methods to show what he had done. He wanted everybody's processes examined, and he was quite prepared to sacrifice his if it was shown by a Standardisation Committee that they were not suitable.

Oil Possibilities in Scotland

"Geological Evidence Entirely Against the Presence of Any Oil"

A LARGELY attended meeting of the Mining Institute of Scotland was held on Saturday, October 18, in the Heriot Watt College, Edinburgh, when a paper was read by Mr. H. M. Cadell, B.Sc., F.R.S.E., on "Scottish Oil Possibilities."

The President (Mr. R. McLaren, M.P.) said that the subject to be dealt with was causing a good deal of discussion throughout the country. Not only in Scotland but throughout England mining engineers had been discussing it for several months. Bores had been laid down in Derbyshire to ascertain if oil could not be found there, while at this moment they were boring for oil in the Lothians of Scotland. In such circumstances they were grateful to Mr. Cadell for coming forward with a paper in which his views were fairly and fully set forth. Mr. Cadell had taken a lively interest in geological research, and his opinions on this subject would carry weight.

Mr. Cadell at the outset said it was impossible to speak too seriously of the fuel question in this country. He did not pose as an oil expert, and many professional oil-finders might entirely disagree with his views. He had, however, taken a deep interest in the Scottish oil industry ever since he was in the Geological Survey, when he for the first time surveyed and mapped the shale-fields of the Lothians in 1884 and subsequent years, and was able to settle definitely the geological succession of the various oil seams and the associated strata. He had since then visited oil-fields in America, at Baku, and elsewhere, and seen something of the occurrence of petroleum in the liquid state, and what he had to say on the possibilities of finding oil in Scotland might perhaps be of use now, either in the positive or negative direction.

The Origin of Mineral Oil

The question of the origin of mineral oil lay at the root of the matter. Various theories had been propounded to account for the oil that occurred in the liquid form, and for the oil that could be produced from oil shale and other substances in the ground. One theory attributed rock oil to volcanic and chemical agencies that had worked on a synthetic principle in certain places, and this hypothesis actually attributed the oil in our shales to the numerous occurrences of volcanic or intrusive eruptive rock in the district. Such a hypothesis was too absurd for serious notice. All really competent authorities were at one in ascribing mineral oil to an organic source in the shape of vegetable or animal remains embedded in certain strata, the decomposition of which had produced solid or liquid hydrocarbons or natural gases. Here the theorists again differed as to the details of the operation, and into the various points of the discussion he need not now enter.

The origin of the oil in the shales had been explained in two ways. The first and most natural explanation was that the shales were originally beds of fine silt or clay, deposited in lakes or lagoons near the shores of a carboniferous land area, and the impalpable mud was mixed with a large quantity of vegetable or animal matter, like the black vegetable slime that was washed off a peat moss. During the carboniferous period vegetation was luxuriant, and there were both forests and peat mosses, the debris of which might easily be washed away and deposited in the adjacent lagoons round the coast or in land-locked basins where the water was tranquil. What better explanation from the purely geological point of view could they have than that the shales were merely vast deposits of fine mud intimately mixed with impalpable peaty particles? The vegetation mud in the oil shales formed a more or less uniform impervious stratum, and each seam originally covered a wide area—more than one hundred square miles in extent. The uniformity in composition and the extent of the shales was remarkable, and could only be explained by a long-continued deposit of fine silt under steady conditions of climate and topography. This explanation appeared to him the most simple and natural way of accounting for the origin of the Scottish oil shales.

A Second Hypothesis

A second hypothesis had lately been advanced by one or more experienced oil experts better acquainted, perhaps, with the occurrence of liquid petroleum than with the geological features of the Scottish shalefields. Upon the validity of this theory the whole question hung.

If it was right, then the prospects of finding oil by boring were much brighter than if his view was the true one. This theory regarded the shales from the point of view of the petroleum oil-finder, accustomed to deal with oil sands or reservoirs of liquid oil, such as occurred in all the world's important oilfields. According to this view one or more reservoirs were to be found somewhere, presumably at considerable depths below the surface, that had only to be tapped by boring to produce a good supply of liquid oil. With that idea boring was begun near West Calder last summer and further boring was proposed in Midlothian near the Roman camp in the Dalkeith coalfield. Let them consider the available evidence and take the various points in order from the geologist's standpoint.

(1) Petroleum had been found in greater or less quantities in all geological formations from the Silurian in America to the middle or later Tertiary in most other countries, so that there was no inherent impossibility, so far as geological age was concerned, of finding it in the local rocks of the carboniferous system. It was common knowledge that by far the largest and most important oilfields occurred in the Tertiary regions, and that comparatively little oil had been found in carboniferous areas, although these had been best explored. While it was not geologically impossible, it was at the same time not very probable that the Scottish carboniferous system would prove richer in oil than the rocks of the same age elsewhere.

(2) In all good oilfields the oil occurred either in beds of porous oil sand, or in limestone of an open, spongy nature full of cavities through which liquid could percolate. These pervious oil beds were, as a rule, covered by an impervious bed, such as clay or shale, in which there was little or no oil.

(3) Accompanying the oil there was always an immense quantity of compressed gas, and the oil fountains were to be generally ascribed to the great pressure exerted by the gas when the pressure was locally relieved by boring. Brine was also a common accompaniment of petroleum, and had led to the supposition that the oil sands had a marine origin.

(4) The oil occurred along lines of anticline or arches in the strata, in areas where there were wide tracts of rock which might indeed be bent or folded, but were not actually broken or interrupted by lines of fault or dykes of eruptive rock. In such comparatively undisturbed regions the oil in the porous strata was evidently free to flow underground for long distances, otherwise the local fields would very soon become exhausted.

(5) The presence of petroleum was generally indicated by seepages of oil or bitumen deposits, by gas issuing from the rock, or by those curious freaks of nature, the so-called mud volcanoes that he had visited at Burmah and at Kertch on the Black Sea, near important oilfields. These five features were common to most of the important oilfields, and if petroleum was to be found in Scotland they must look around for at least some conditions of a similar sort.

The Five Points Reviewed

Discussing the five points *seriatim* Mr. Cadell dealt with the probability of finding oil in a fluid state among carboniferous rocks. He pointed out that liquid petroleum was the exception and not the rule and thus, although not impossible, it was unlikely that much would be found in British rocks of that age. The second point was one that demanded much more attention, namely, the possibility of finding petroliferous strata, and here he was obliged to return to the interesting question of the two opposing theories as to the origin of the oil in the shales. The second of the theories supposed that the shales were not originally petroliferous at all, but were merely receptacles of oil that had been infected or "inspissated" into them in some mysterious manner from some mysterious oil-bearing reservoir in the vicinity, and it did not accept the more natural explanation that he had already put forward. This theory of a subterranean oil reservoir was important because if there was actually such a thing it might not only have provided the oil in the shales, but it might be still in existence and, therefore, capable of prividing the petroleum the present-day drillers were after. The subject was, no doubt, a complex one, and a fruitful field for theorising upon, but he thought it would generally be admitted that the oil must originally have been derived from organic matter in some form and black shales, rich in organic remains, were more likely to have been the source of the oil than porous sandstones with very little organic material. They knew that the so-called oil shale did not contain oil or oily matter at all. It contained a substance called kerogen, which was not oil or bituminous in nature, but at once turned into oil when heated to a certain temperature. In some cases the shales had been invaded by igneous rock which had once been hot enough to raise them to the temperature that would distil the kerogen and produce oil on the spot, but except at such places the kerogen remained unaffected. Now it appeared obvious that the igneous invader had not an extensive temperature because in most cases the surrounding rocks, if affected at all, only showed the effects of the heat for a few feet or inches from the edge of the whinstone mass.

His view of this part of the question was that the Scottish oilfields were a potential oilfield that had been arrested in its infancy for want of the kindly warmth in Mother Earth that was required to turn kerogen into liquid hydrocarbon, but which had produced the finished article in more favoured climes. This view, however, might still be disputed and the believers in the opposing theory might remain unconvinced. There was in Midlothian a remote chance of finding oil, but the St. Catherine's oil "show" was an absolutely isolated one, purely local in character, and not likely to lead to any important commercial results. Small quantities of oil had often been found both in coal and shale mines, but for commercial purposes something far greater was required to be of any commercial use. In the whole of the deep section, measuring in Midlothian some 4,000 feet from the Broxburn shale position to the Old Red Sandstone, where was the mysterious oil reservoir to be discovered? Echo answered "Where?"

The third point, the presence of much gas in the oilfields, only required brief mention. There were no places in Scotland where oil gas issued regularly from the rock in any quantity, and the gas that was occasionally found gave no indications of oil in the underlying rocks.

A more important point, the fourth in the list, related to the geological structure of the ground. Oil, as they had seen, was found along lines of anticline, and some enthusiasts appeared to think that, however unlikely the other conditions might be, if there was only a good anticline to be found, oil was certain to be got by piercing its crest. In the Scottish carboniferous rocks there were many anticlines, great and small, and in one of the latter the West Calder bore was located.

The Scottish Prospects

The proposed boring in Midlothian at the Roman Camp Hill, south of Dalkeith, in the Carboniferous Limestone Series, was on a larger arch and one structurally more favourable for oil than that at West Calder. But now, hoping against hope that there may still be a deep-seated oil-bearing bed, what were the prospects of striking a sufficient flow of oil even to repay the great cost of drilling? If they examined the geological map they found that, although there was an anticline in the beds it was traversed by various faults that would effectually stop the flow of oil for any distance along previous strata. The West Calder bore was close to the large fault on the west side of the Hermand oil basin, and within a mile of it there were two other faults with an east and westerly trend on the north and south respectively, traversing this part of the shalefield. The oil could only reach the spot by rising from the west side, which was locally free of fracturing. In the case of the Roman Camp Hill there were likewise several fault lines crossing the ground in various directions, and indeed it would be difficult to find an area of three or four square miles showing no signs of fracture in that locality. The last point, the indications of oil by seepages or bitumen deposits over oil-bearing beds, was easily disposed of. With the trifling exceptions in the case of the St. Catherine's Well and the local bitumenous inclusions in the Binny Sandstone, the carboniferous rocks of the Lothians showed practically nothing on the surface to indicate the existence of liquid petroleum below.

Evidence all Unfavourable

Summing up the whole matter it would appear that the evidence was all against liquid oil being found in the oil shale fields or carboniferous districts of the Lothians or Fife. As to other places in Scotland, the evidence for oil was probably not any better. A great deal of deep boring had been carried out over many years in search of coal, oil shale, ironstone and water, and had there been any indications of oil or oil gas in these boreholes, it would doubtless have become public property long ago. Oil experts were apt to be very sanguine people, and without sanguine and hopeful minds few new discoveries would be made or useful minerals opened up. For outsiders, however, to come into a district and treat it as practically an unknown and unexplored field, when in reality it had been a subject of careful investigation for generations, betokened very little common sense on their part and an undue disregard of the many workers who had gone over the ground long before them.

He could only speak with regret of the conclusion to which the whole evidence had driven him. The need of a supply of native oil was more pressing than ever, but the difficulty, always great, of carrying on the distillation of the Scottish oil shales in face of the competition of cheap liquid petroleum from abroad had, since the war, in consequence of greatly enhanced wages and prices and lessening output, become very serious indeed. It had often been a wonder to him how the industry could be carried on at all in face of the natural and economic obstacles that confronted it. The industry had faced serious crises before, but not always with success, and many oilworks had gone under in the unequal struggle. It had only managed to keep its head above the water by the inventive genius of such men as Young, Norman Henderson, Beilby and other brainy technologists, who had invented processes for profitably extracting all the products that could be squeezed out of the shale. There were at the present day many ill-instructed people who loudly proclaimed that all wealth was the product of manual labour. The existence, however, of the Scottish shale oil industry provided one of the many notable proofs of the complete fallacy of this proposition. It was in reality the fruit of super-capable brain power and capital far more than that of mere labour.

Still one Untapped Source of Oil

Finally, Mr. Cadell said he did not wish to end with an altogether pessimistic note as there was still an untapped source of oil he would like to refer to. The peat mosses were said to be larger than the coalfields, and recent investigations had shown that the deep black peat in some large bogs was, when once the water was eliminated, richer

in oil and ammonia than the best oil shales. The dry peat in some cases could be made to yield more than twenty-six gallons of oil and one hundred pounds of sulphate of ammonia per ton, and one large bog in Midlothian had enough nitrogen to produce 180 tons on a practical scale, which was worth 22s. 6d. per ton for that product alone, with the oil and other products of distillation in addition. The peat, if dry, was thus worth about three times the value of ordinary shale that had up till now been workable at a small profit. The difficulty was eliminating the eighty to ninety per cent. of water in the peat before it could be distilled for oil and ammonia. This was a new and a large source of oil and might appropriately be investigated, as it had great possibilities, and would be very advantageous as an industry, especially in many of the poorer districts in the Highlands of Scotland.

Government Operations Criticised

In the course of the discussion which followed, Dr. Flett, of the Geological Survey, reported that the West Calder bore was now down to a depth of 900 feet, but at the bore in the vicinity of Dalkeith there would be some little delay before drilling could be commenced. The situation of the Scottish bores had been most carefully selected, and he could state from personal knowledge that steps were being taken to procure perfectly definite opinions on this important although highly disputatious subject. Within a comparatively short period the results would be to hand, and if the wells did not yield oil then, in view of the strong opinions of Scottish geologists, it was not at all unlikely that the question would be regarded as finally settled.

Mr. Robert McLaren, M.P., the president of the Institute, said he did not know what the cost of these boring operations in the Lothians would be. If the bores, however, did not turn out satisfactorily, as appeared to be foreshadowed by Scottish experts, then the House of Commons and the public would assuredly have something to say.

Mr. R. W. Dron, Glasgow, said that during the war he had been somewhat anxious to see if nothing could be done in the way of boring for oil in Scotland, and he entered into communication with the Petroleum Investigation Commission. He put before that Commission some ideas of his own on the matter, and a letter which he had received from Mr. H. M. Cadell, of Grange, strongly condemning the whole thing. At that time the Commission came to a decision to do nothing in the way of boring for oil in Scotland. It, therefore, came as a great surprise to him to find that, having taken the opinion of outside experts, the Commission had decided to proceed with the bores.

Mr. Cadell, replying to some points raised in the discussion which he undertook to deal with at greater length at a subsequent meeting, said he felt it was a great mistake on the part of the Government, especially in England, to lay down new bores before they had ascertained the definite results from any single bore that had as yet pierced the ground. It was, he feared, a serious waste of public money. No one, he concluded, would be better pleased than himself to see the two Scottish bores successful but the geological evidence was entirely against the presence of any oil there.

Further discussion was adjourned until next meeting.

Site, Lay-out, and Construction of Chemical Works

Notes by Mr. John Allan

Mr. J. Allan (Messrs. Joseph Crosfield & Son, Ltd.) delivered on Tuesday the first of two lectures at the Manchester Municipal College of Technology on "Site, Lay-out and Construction of Chemical Works." He intimated at the outset that he would concern himself with principles rather than with details

Selection of Site

In determining the site of works there were seven chief points to be considered: (1) the locality and location; (2) whether the material produced was to be consumed locally or to be sent away in some form of manufacture; (3) the supply of raw materials; (4) fuel; (5) water supply; (6) the disposal of effluents and waste; (7) the supply of labour.

While he had stated these conditions separately, they were interwoven. One important factor in connection with the selection of site and establishment of works was transport. Undoubtedly the site should provide facilities for transport, and the more direct the connection with a shipping port the better the site, so long as raw materials and finished products had to be brought from or to the works. An important point in transport was that materials might be packed in a variety of sized articles. There was no good in carrying a package consisting of one-fourth container and three-fourths materials, if you could have a container which was one-tenth and nine-tenths were materials. In considering the form of transport, it was necessary to take into account the moving to and fro of heavy containers and the reduction of the cost of handling. In selecting a site he suggested that in certain cases it was possible to convey by pipe line more than some imagined, as in the case of supplying salt in a brine solution.

Fuel

Fuel was an absolute necessity to chemical works, and the locality of them might be in a large measure determined by the balance struck between the cost of bringing raw materials to the works, and of bringing fuel. One could determine what quantity of raw materials was intended to operate in a factory in a given period of time and also estimate how much coal was going to be used or handled in the same period, and so ascertain which was going to cost most—to carry fuel to the works, or to take the works to the fuel. It must not be forgotten that fuel was used for various purposes, and it might be necessary to decide which particular class of fuel was to be located, as, for instance, steel-raising or process coal. Then again, if gas production or the use of gas producers was going to be a permanent feature, it might be necessary to consider whether the particular type of coal in the locality contemplated was a satisfactory type. An item that might be very well considered was the question of electricity supply. If the supply was cheap, it might clear up many difficulties, because of the ease with which it could be transported in considering where works should be located. The nature of the operations to be carried on would decide whether a cheap supply of electricity was to be a determining factor in the location of the works. Take the case of a potash factory located on the banks of an important river, located in the heart of an agricultural area, where there was a prospect of getting an extremely cheap site and all the labour required at a comparatively low rate, where the current needed for operations was supplied cheap, and there was connection with the sea by river and barge.

With regard to the question of water supply, they turned naturally to a port as a natural means of supplying sea water, but they must not lose sight of the fact that, although sea water was useful, as for condensing purposes and cooling generally, some other source of water supply must be available.

Effluents and Waste

Touching upon effluents and waste, Mr. Allan reminded his audience of the many sources of trouble which might arise from interference with the rights of riparian owners. Frequently works were located in fairly populous areas where drains were provided, and where the local authority would permit an effluent to be turned into them. Serious trouble might, however, be caused where it was decided to extend the business, and to make up certain substances such as phenol. The whole bacteriology of a system might be upset, and the bacterial beds rendered no longer active, from the discharge of comparatively small quantities of chemical material.

Another point worthy of consideration in connection with the discharge into drains rather than into an open river was the nature of the effluent. Materials might be discharged which would produce poisonous and even explosive gases. Mr. Allan also directed attention to what might be the very detrimental effects of discharging solid waste in the effluent.

In considering sites, the lie of the land was an important matter to consider in dealing with waste and deciding where to put it. It was necessary to take all precautions where the rights of riparian owners were concerned in regard to the effluent from works, with respect to the blow-off from boilers. There were often objectionable wastes, sometimes highly toxic, to be dealt with, and probably the best way of dealing with them was burning. The question where the boiler clinker was going was a matter for careful consideration, and he suggested it might be usefully employed in the filling in of low-lying land.

Another form of waste was very important, namely, factory dust. As to this, Mr. Allan advised attention to the prevalent direction of the wind in the general arrangement of the works. They had to consider that direction also in relation to the emission of fumes. The question of labour supply was important. It was no use placing works where they wanted a hundred men in a locality and could only get ten. Advocating also the desirability of placing works where there were facilities for construction and repairs, he said that cheapness of materials only must not be aimed at.

The Chemical Industry Club

A Successful First Year

THE annual meeting of the members of the Chemical Industry Club was held at the Club premises on Monday evening. Dr. Hodginson presided, and there was a large attendance.

The Chairman reminded the members that they had come to the end of the first year of their existence as a club, and congratulated them on the very satisfactory position they had already attained. He hoped that the Club would be a starting-point for joining all the chemical industries in one great combination, and would constitute a home and meeting-place for the whole industry. They had done exceedingly well up to now, and they were on the right lines for making the Club a great success. The financial position might also be considered quite satisfactory for the first year, and they were looking forward to being in a much stronger position next year. On the motion of the Chairman the annual report of the Committee (which was published in THE CHEMICAL AGE of last week) was adopted.

The accounts and balance-sheet were presented by Captain C. J. Goodwin, and adopted. The prospects for the coming year were regarded as very good.

Mr. H. E. Coley was re-elected hon. secretary, and Captain C. J. Goodwin hon. treasurer, with a vote of thanks for their services. Authority was given to the committee to appoint, if they thought fit, an assistant secretary to Mr. Coley.

Considerable discussion took place on the question of appointing a president of the Club. The point was strongly put that there was no urgency for such an appointment at present, and that as the Club was moving forward so satisfactorily to an established position, it would be undesirable to introduce any changes at this stage. Finally it was decided to defer the question of creating the post of president until such time as the committee thought it desirable to raise the matter again.

Should Wages be Lowered?

Mr. E. J. P. Benn's Case Against Reduction

AT a meeting of the Industrial League and Council, held at the Guildhall on Tuesday, with Mr. J. H. Thomas, M.P., in the chair, Mr. E. J. P. Benn, speaking on "Should Wages be Lowered?" said that there were a good many short-sighted, old-fashioned people, who were secretly hoping that wages would go down, and who would miss no opportunity to bring that result about. Those people overlooked the fact that the cost of living would not go down until labour made up its mind to tackle the problem of production, and labour was unlikely to tackle that problem seriously if its only reward was to be a reduction in the rate of wages. Labour had learned a lesson in the last few days. Every labourer had discovered the uselessness of money wages considered as money. The only salvation for labour and for the country lay in higher production.

At the moment there were four elements in industrial success which alone in combination could give us suctess, namely: high wages, high production, high profits, and low prices. They could not get wages out of profits, or profits out of wages, or either without producing, and they could not get low prices without large production. Suppose it were possible, by means of an understanding on wages, to secure the whole-hearted co-operation of the complete industrial army on the question of production. It was almost impossible to conceive of the power that would come if we could one morning reverse our point of view, and if ten million hearts and hands and brains could suddenly be made anxious to see how much they could do. That very simple alteration in the point of view of each one of us would multiply our power as a nation indefinitely.

The first need was to make the mind of labour easy on the matter of wages. There should be an honourable understanding among employers that a wage, once given, was never withdrawn. From that simple understanding would arise more caution on both sides in asking and giving further increases, and the first effect of such an understanding would be a cessation of the constantly recurring demands which are the chief difficulty in making long term contracts. The stupidly popular theory so widely held at the moment that half the population consisted of wicked, scheming, greedy profiteers, was rapidly manufacturing the very evil that it meant to cure. There need be no trouble about wages or prices or profits, if we would make up our minds to work with a will and to concentrate on the problem, not how to make work go round but to abolish all the work we could by the adoption of speedier and quicker methods.

Agricultural Research

New Laboratories at Rothamsted

PROFESSOR H. E. ARMSTRONG (Vice-Chairman of the Lawes Agricultural Trust) presided at the opening of the new laboratories at the Rothamsted Experimental Station, Harpenden. The buildings contain a complete library and laboratories devoted to physics, protozoology, entomology, and mycology, the latter two being used in the new institute of plant pathology. Sir A. Griffith-Boscawen, Parliamentary Secretary to the Board of Agriculture, said that agriculture had been neglected in the matter of research, invention, and experimentation. Then those institutions grew up, and the Board of Agriculture had adopted their policy on what they had learnt from them, and were now spending a respectable sum of State money in agricultural educational research. The Rothamsted Experimental Station began in 1843 with chemical experiments in a barn, and manurial trials in two fields. Important results were obtained, the fame of which gradually spread, until in 1854 the farmers of England subscribed to build a proper laboratory in which more detailed chemical work might be carried out. For fifty-eight years Lawes and Gilbert worked together, Lawes bearing the whole expense of the experiments. In 1889 he founded the Lawes Agricultural Trust, and endowed it with £100,000 so that the work could continue after his death. The results of the older Rothamsted experiments revolutionised agricultural science and practice in all parts of the world. Their best known achievement was the introduction of artificial fertilisers, but equally valuable work was done in connection with the feeding of animals, the study of soil fertility, and the inter-relationships of animal and crop husbandry.

Benzol and Toluol Production at Birmingham

AT the toluol plant at the Nechells Works of the Birmingham Corporation Gas Department, 850,000 gallons of benzol and toluol for the manufacture of high explosives (T.N.T., lyddite, ammonol, &c.) were produced from April, 1915, to Armistice day. Describing the operations (the chief features of the plant are two Davidson-Liversedge centrifugal washers and a distillation unit), one of the works chemical engineers says: The centrifugal washers revolving at 120 revolutions per minute, possessed an insatiable appetite for coal gas and wash oil. It was in those washers where the coal gas and cold wash oil were thoroughly mixed and again separated, that the coal gas was persuaded to relinquish its benzol, toluol, &c., vapours to the wash-oil. The solution of wash-oil and vapours, technically termed "benzolised oil," then took a devious course to the distillation unit. In this part of the plant the benzol, toluol, &c., vapours were separated from the wash-oil by the agency of high and low pressure steam, and these vapours, after condensation, were termed "crude benzol." The oil termed "debenzolised oil" was cooled and sent off to the washers again for a further charge of the vapours, and thus the cycle of operations continued. The crude benzol, after partial rectification, was sent by railway wagon to outside refineries, and thence to the explosive works." Crude benzol, after treatment, is an excellent fuel for the motor industry, and the Nechells plant is now being worked for the production of motor spirit. It is hoped shortly to manufacture the refined motor spirit on the gas works.

Barimar Scientific Welding

THE value in ship repair work of the Barimar Scientific Welding method is illustrated by an operation recently executed upon a vessel in a North-East Coast port. A bad fracture of machinery completely held up the ship. It was impracticable to send the broken piece to London, as it weighed well over twelve tons. The owner was faced with two alternatives—the purchase and adjustment of a new equipment at a cost of several thousands of pounds, or a Barimar repair on board ship, at one-thirtieth of the cost. By a free use of the telegraph wires, Barimar's London office speedily arranged for a guaranteed repair. Within three days of the arrival of their engineers on board ship the work was completed, and ship and crew were soon back at work. A portion of the main body of the condenser was badly broken, and the forward end plate or door of the condenser had burst off and split into several pieces. The condenser, grey cast iron of considerable thickness, was fractured to an extent of five feet.

A German Poison-Gas Factory

SIR THOMAS OLIVER, in an article in the *Yorkshire Post*, describes his visit to the great factory at which the Germans made their poison gas. It was my privilege, writes Sir Thomas, to visit the large aniline dye works and the chemical factory wherein during the war the gas was made which caused the death of many French and British soldiers, and where now, as in pre-war time, aspirin, the salicylules, bromides, hedonal, and veronal, etc., are made. Nemesis has overtaken the factory, for the administration block, with its many offices, is occupied by British soldiers, while the houses of the junior head of the firm, the manager, and heads of departments are the headquarters and mess of a British Army Corps. I was conducted over the works by a German who had been interned in England, and had recently returned home. There are 6,000 persons employed in the factory, or 1,000 more than in the pre-war period. When asked if the extra 1,000 persons employed meant more business, the guide replied in the negative, saying that since the introduction of the eight hours day, the workpeople were producing less and less, although for their services they were receiving three marks an hour. It may convey some impression of this well-equipped factory when I state that it has thirty miles of railway within its walls, that it consumes seventeen million gallons of pure water every day, brought from an upland gathering ground many miles away, that 200 tons of ice for cooling purposes in the works are made daily, that 325 doctors of chemistry are employed in the laboratories, doing research and repeat work, and that there are 400 technical assistants. In the works there is a continuation school, which, on two afternoons in the week, all young persons from fourteen to sixteen years of age attend.

British Window Glass Co., Ltd.

THE statutory meeting of the members of the British Window Glass Co., Ltd., was held on Tuesday in London, Mr. Charles C. Hatry presiding.

The company was formed primarily (the Chairman said) to acquire the sole rights for the manufacture and sale of sheet or window glass in Great Britain under the processes and inventions of Monsieur E. Founcault, of Charleroi. It was common knowledge that, prior to the recent war, the manufacture of glass, and more particularly window glass, had passed almost entirely to factories on the Continent of Europe. As a British industry it was almost non-existent, and one of the primary objects in forming this company was to bring back to Great Britain a vital industry that never should have left it. Since the armistice he had visited Belgium on two occasions, and on the last occasion was more than ever impressed with what he saw at Charleroi, and more convinced than ever of the value of the English rights which this company had acquired. They had been successful in acquiring ten acres of land at Queenborough, with an option of a further ten acres, and were proceeding with the erection of their first unit.

He did not think it possible in the whole of Great Britain to find a more suitable site, or one more admirably adapted for the business. Queenborough is a free port at the mouth of the Medway, where there is an unlimited quantity of the quality of sand which is specially suited for window glass, and where the Queenborough Glass Bottle Works, with whom they are in intimate association, has been at work for the past twelve years or more.

Petroleum Possibilities in British India

A THEORY is being discussed in British India, that oilbeds exist continuously along a belt stretching from Burma in the east to Roumania in the west. Should the fact be eventually established a discovery of the very highest importance will have been made, for the belt, according to *Indian Engineering*, will lie wholly on the Indian side of the Himalayas.

At present, however, the *Board of Trade Journal* states, only uncertain indications have been found, the latest of which have been discovered by Mr. Middlemiss, who is at present Superintendent, Mineral Surveys of Kashmir. He has not so far actually found oil in Jammu Province, but has located geological conditions pointing to the existence of a natural reservoir of a type giving good promise of a store of oil, being in all respects similar to oil-yielding structures in the neighbouring Rawal Pindi plateau. In the latter region oil had long been known to be present, but efforts to obtain it in quantity were unsuccessful till the Khaur oilfield near Pindigheb was at last located.

Discussing the general question of the occurrence of oilbeds along the sub-Himalayas, Mr. Middlemiss says: "The whole of the belt of stratified rocks in Jammu embraces a section of the sub-Himalayan rocks of tertiary age from eocene upwards, which are identical in composition, age, and lithological characters with those of the petroliferous series in the neighbouring Rawal Pindi district. They are also identical in age with, but differ in some particulars lithologically from, the petroliferous series in Assam and in Burma, and also in the newly-discovered fields in Persia. In fact, they form with these known petroleum-bearing areas what is really one continuous but intricately winding belt of deposits belonging to one comprehensive geological epoch, that stretches from Persia on the one hand to the extreme south of Burma on the other. It is also equally true that in general characteristics and in age these rocks exposed in Jammu agree with those of a great proportion of the more distant successful oilfields of the world, notably with those of California, Peru, Russia, Roumania, Galicia, and Sumatra."

Pena Copper Mines (Ltd.)

MR. CIL. CAHEN D'ANVERS (chairman), presiding at the twentieth ordinary general meeting of the Pêna Copper Mines (Limited), on Friday, October 17, said that investigations below the twelfth level by means of diamond drill holes were carried out during the year, but this work was not being pushed for the present, as the ore reserves now in sight were amply sufficient to keep them going many years even with a greatly increased output. The output of ore was 91,827 tons, as against 160,121 tons in the previous year. The reduction was due to the difficulty in obtaining freightage and to the control of pyrites exercised by the Government. This control was removed at the end of last May, but its influence would be felt until the stocks accumulated in this country by the Government had been absorbed. The production of fine copper amounted to 554 tons, as compared with 587 tons in 1917. They suffered from scarcity of water during a great part of the year, which had the effect of reducing the quantity of copper produced and greatly increasing the consumption of iron. It was impossible, owing to the unsettled state of affairs still prevailing, to venture upon any forecast for the future, but they were justified in thinking that a return of more normal times would show a corresponding improvement in the balance sheet.

Nitrate in Anglo-South America

AT the annual general meeting of the Anglo-South American Bank (Ltd.), held in London on Wednesday, Mr. R. J. Hose (chairman) said that the position of the nitrate industry since the termination of the war has not been satisfactory. At that time the Allied Governments were left with very considerable stocks in hand—sufficient for all immediate industrial, agricultural or other necessities—with the consequence that further shipments from Chile during the current year have been almost negligible. Production, however, has been continued, although on a greatly reduced scale, reports showing that the recent output to the end of September is well under one half of the normal. In spite of this restricted production, the absence of shipments, already referred to, has resulted in accumulation of stocks in Chile to the unprecedented figure of 37,000,000 quintals. A good deal of activity, however, has recently been shown, and some 1,100,000 tons have been contracted for shipment up to March of next year. There appears to be no doubt that the commodity is now urgently needed, not only in the whole of Europe, but elsewhere, and the prospects generally are fairly encouraging. The principal difficulties for the time being are the questions of tonnage, which is scarce, and freights, which continue very high, while in some countries the question of finance also enters largely into the problem. They were hopeful of a gradual return to normal prosperity, and were convinced that the better the merits of nitrate as a fertiliser are known, the better would the prospects become. The formation of an association in Chile for the centralisation of sales and regulating other important matters connected with the industry would also, it was hoped, prove beneficial.

From Week to Week

THE LATE MR. E. F. STRICKLAND, of Ealing, chemist, has left estate valued at £23,924.

OWING TO COAL SHORTAGE, it is stated, 115 German works are idle.

THE LATE ALDERMAN JOHN SLATER, chemist, Blackburn, has left estate valued at £21,132 (net personalty, £13,835).

THE LATE MR. L. A. COCKER, Ph.C., of Llandudno, chemist, has left estate valued at £3,818.

THE MINISTER OF MUNITIONS has suspended the operation of the Tungsten and Molybdenite Order, dated November 30, 1917.

FIVE HUNDRED CASKS of rum and 15,000 bags of sugar were included in the cargo of the *Venezia*, which was abandoned on fire in mid-ocean.

THE BOARD OF TRADE announce that "The Profiteering Act, 1919, Maximum Prices Order No. 2," which fixed maximum prices for the sale of motor spirit, has been revoked.

THE BOARD OF TRADE announce that cotton-seed oil, oleo, sesame oil, lard (imitation, compound) and lard (neutral) have now been removed from List A of prohibited exports.

MR. HERBERT J. GEORGE has been elected to a research fellowship in natural science, combined with a lectureship in chemistry, at Jesus College, Oxford.

THE BETHLEHEM STEEL COMPANY and the United States Steel Corporation have purchased large deposits of iron ore in Brazil.

THE LATE MR. A. S. PICKERING, of Catford Hill, S.E., late of Dunster House, Mincing Lane, quick-silver and chemical broker, has left estate valued at £56,287.

THE SUM OF £39,086 has been left by the late Mr. R. K. Bell, of Middle Park, Paisley, dyer and cleaner, of the firm of A. Bell & Sons, Ltd.

THE AREA SOWN WITH INDIGO in the Madras Presidency, which represents 53 per cent. of the total area under indigo in British India, was estimated in September at 65,300 acres against 114,700 acres last year.

A NEW CHAIR OF PHYSICAL CHEMISTRY has been established in the University of Bristol, on the endowment of Lord Leverhulme. Capt. J. W. McBain, lecturer in physical chemistry in the University since its foundation, has been appointed to the chair.

MR. FRANCIS FLETCHER, of the "Seven Gables," Sutton Coldfield, Warwick, a director of Wyleys, Ltd., manufacturing chemists, who died on May 15, aged seventy-six, left estate of the value of £39,080 6s. 1d. with net personalty £34,025 15s. 9d.

DAMAGE AMOUNTING TO several thousand pounds was caused last week by a fire which broke out at the oil mills in Burlington Street, Liverpool, adjoining the docks, owned by Messrs. Earle & King, an associated firm of Lever Bros.

THE SALTERS' INSTITUTE OF INDUSTRIAL CHEMISTRY has awarded grants in aid to thirty young persons occupied in chemical factories in or near London to assist them in improving their knowledge of chemistry.

THE SUM OF 500 GUINEAS has been apportioned by the shareholders of the Kern River Oil Fields of California, among the following charities:—St. Dunstan's Home for the Blinded Soldiers and Sailors, £210; London Hospital, £105; St. Bartholomew's Hospital, £105; Guy's Hospital, £105.

THE OPERATION OF THE FLAX SEED (IRELAND) ORDER, 1918, dated June 18, 1918; the Sale of Flax Seed (Ireland) Order, 1918, dated September 20, 1918; and the Flax Seed (Shipment from Ireland) Order, 1918, dated September 20, 1918, has been suspended until further notice.

CEMENT WORKERS OVER EIGHTEEN throughout the country have obtained an advance of 5s. per week. Proportionate allowances are to be made to those under eighteen. War advances will be consolidated into wages, and the scheme takes effect on November 1.

THE MEMBERS of the Operative Bleachers, Dyers, and Finishers' Association of Lancashire have decided to hand in their notices to cease work on November 1. They number 60,000, and have been negotiating for an advance of wages since June.

THE EDINBURGH UNIVERSITY COURT has decided to erect at once on the new site at Blackford Hill the first part of the new chemical laboratory. The estimated cost of this part is £60,000, and the cost of the new chemical school, when completed, will be about £250,000.

THE FOLLOWING have resigned their positions with Boots Pure Drug Co., Ltd.: Mr. F. H. Carr, F.I.C., F.C.S., director and chief works chemist; Mr. M. Barrowcliff, F.I.C., F.C.S. chief research chemist; Mr. J. R. Bedford, chief of sales department; Dr. Mott, F.R.S.; and Dr. Naef, F.C.S.

THE BATLEY AND BIRSTALL CHAMBER OF COMMERCE COUNCIL have passed a resolution, urging the Board of Trade to take steps to secure, without further delay, an adequate supply of such dye-wares as are essential to the woollen and many other British industries.

READERS who still have forms of the petition to Mr. Lloyd George on the Dyestuffs Licensing question, which is being organised by the British Chemical Trade Association, are asked to return them forthwith to the offices of the Association, 80, Fenchurch Street, London, E.C. 3.

ACCORDING TO *Stubbs' Weekly Gazette*, the failures in the United Kingdom for the week ended October 18 were twenty-seven, an increase of seven. The numbers of bills of sale registered and re-registered was 102, an increase of thirty-four. Mortgages and charges registered by limited companies amounted to £450,645, the amount authorised (where stated) being £1,670,000.

CAPTAIN H. HINCKS has been appointed by the President of the Board of Trade to succeed Mr. J. W. Hands, O.B.E., as Controller of the Profiteering Act Department. Mr. Hands accepted the post of Controller during the organisation of the Department at the request of the President, and has now resumed duty in the Board of Education.

THE NATIONAL OIL REFINERIES CO., LTD., a subsidiary of the Anglo-Persian Oil Co., Ltd., appealed at Glamorgan Quarter Sessions, at Swansea, against the rating by the Assessment Committee of Neath Union of Gnoll House, Neath, used for the accommodation of the Company's staff. The rating is £285 gross and £220 net. After hearing evidence, the Court allowed the appeal, and fixed the rating at £230 gross and £192 net.

THE NEW SCHEDULE OF ARTICLES to be brought within the operation of the Profiteering Act, signed on Saturday, includes all drugs (excluding quinine sulphate, which is controlled), medical preparations, including tooth powders, talcum powders, Fuller's earth. All articles used for fuel and lighting (except coal), including candles, lamp oils, kerosene, petroleum, paraffin, firewood or fire lighters, methylated spirit, matches.

THE BIRMINGHAM CITY COUNCIL has decided to set up a municipal laboratory for the carrying out of the bacteriological work, &c., hitherto done by the University of Birmingham for the Public Health Department. Lodge Road Hospital is to be used for this purpose, and the cost of the equipment of the building is estimated at £5,600. Dr. H. Henry (London) has been appointed bacteriologist at a salary of £700 per annum.

MR. L. F. NEWMAN, M.A., has been elected to a Fellowship at St. Catherine's College, Cambridge. After taking a diploma in agriculture, Mr. Newman graduated, in 1909, and remained at Cambridge as research student and lecturer in agriculture, chemistry, zoology, and botany. During the war he served as captain in the R.A.S.C., and last year was Secretary to the Food Investigation Board.

THE COUNCIL OF THE CHEMICAL SOCIETY has arranged for the delivery of three lectures during the coming session dealing with the work accomplished by chemists during the war. The first of these will be delivered at Burlington House, on December 18, at 8 p.m., by Prof. James Walker, who will lecture on "War Experiences in the Manufacture of Nitric Acid and the Recovery of Nitrous Fumes."

FOUR EMPLOYEES AT MESSRS. W. J. BUSH & CO.'S chemical distillery, Ash Grove, Hackney, E., were injured as the result of a small fire which broke out in the mixing room on Wednesday. The volunteer brigade at the works extinguished the flames before the arrival of the Hackney firemen. The damage caused to the factory was comparatively slight. The names of the injured men are Richard Hamphire, Walter Waymond, John Henry Huil, and Thomas William Arnold.

AT AN INQUEST at Huddersfield, on Isaac Brown, a labourer, who was killed by an explosion of a pan at the works of Messrs. L. B. Holliday & Co., dye makers, of Deighton, near Huddersfield, evidence was given that the pan had a steam jacket, with neither water gauge nor safety valve. Mr. E. W. Norris (the coroner) said that probably the danger was not realized either by the

workmen or by the management. It was for the management to devise some means of preventing such an occurrence in the future. A verdict of "accidental death" was returned.

THE ROUMANIAN LEGATION at Geneva has issued a statement to the effect that 100,000 shares in the Speanarona oi wells which were formerly held by the Deutsche Bank, have been presented for stamping in Switzerland, with the object of exempting them from cancellation under the conditions of the Versailles Treaty. The Roumanian Legation at Berne, it is stated, has refused to recognise these shares in pursuance of an arrangement arrived at among the Allied diplomatists at Bucharest, and the consequence will probably be that the control of the Roumanian oil output will fall into the hands of the British-Dutch group.

THE COURT OF ARBITRATION, having considered a claim by workers in the drug and fine chemical industry for the reduction of the working week to forty-four hours, payment for overtime at the rate of time and a-half, and minimum rates of wages varying from 65s. to 60s. a week for males and 45s. to 37s. 6d. for females, have decided against a reduction of the working week and the payment of the minimum rates. Adult male employees whose rates of wages do not exceed 15s. above the minimum set out in the claim for their respective grades are to receive an advance of 5s. a week, and those whose wages exceed 15s. above the minimum are to have such an advance as will give them rates not exceeding 20s. above the existing minimum for the respective grades.

IN A LETTER addressed by the Board of Agriculture to the British Sugar Beet Growers' Society, the new President, Lord Lee of Fareham, expresses his desire to ensure a complete and trustworthy test of the commercial possibilities of the growth of sugar beet and the manufacture of sugar from it in England. The Chairman of the Society, Sir Beville Stanier, M.P., states that its scheme, approved by the Government, which formed one of the recommendations of Lord Selborne's Agricultural Reconstruction Committee, is to carry out this project on the estate which it has secured, with Government assistance, at Kelham, near Newark. The management will be in the hands of the public shareholders, with the control of certain matters of financial policy by the financial representative of the Government on the Board.

THE COLLEGE COMMITTEE of the Exeter University recently made application to the Pharmaceutical Society for recognition of the college as a place of instruction under their new regulations. After an inspection of the college the Society agreed to send there from twenty-five to thirty ex-service students if the college would promise the staff and equipment for a full time day course in pharmacy in preparation for their qualifying examination. The College Committee have sanctioned the establishment of the school, and the following additions to the staff have been made to meet the needs of the new department:—Lecturer in Pharmacy Mr. Alan H. Ware, Ph.C., at a salary of £275 per annum; assistant demonstrator in chemistry, Mr. John G. Williams, B.Sc. (London); salary, £275. A room in the York wing of the College has been equipped as a pharmaceutical laboratory, and the estimated expenditure on the equipment of the room and for drugs and apparatus is £200. The fees for the course are £31 10s., and nearly forty ex-service students are in attendance. Application has been made to the Board of Education for the recognition of the school of pharmacy under the regulations for day technical classes.

MR. W. H. J. VERNON, in a paper read before the Birmingham Metallurgical Society last week on the corrosion of metals, laid stress upon electro-chemical action in the practical problems of corrosion. The action of internal galvanic couples in effecting the corrosion of metals and alloys was demonstrated. It was pointed out, however, that while in the light of the electrolytic theory perfect homogenity should ensure freedom from corrosion, non-homogenity, still without defection from the theory, does not necessarily stand for corrodibility. Mr. Vernon described his investigations on the corrosion of extruded brass rods partially immersed in acid solutions of salts. The destructive action at the water line was found to be increased largely by the presence of certain salts, and also by rise of temperature. The action of light was found to set up a curious type of electro-chemical corrosion. The effect of different annealing temperatures was demonstrated, and suitable annealing was shown to reduce water-line corrosion. The action on the metal was shown to be one of dezincification of the brass from the surface inwards, acting preferentially on one of the structural constituents. Thus the metal retains its external form even when it has been very largely converted into copper. The latter, however, when the action has proceeded sufficiently far, is easily detached from the inner core of uncorroded brass.

The Licensing of Dyestuffs

To the Editor of THE CHEMICAL AGE.

SIR,—We note with interest the letter from the British Chemical Trade Association in your issue of the 11th instant.

We suggest, in the first place, that if names of dye manufacturers are required, application should be made to the Association of British Chemical Manufacturers. If the Dyestuffs Licensing Sub-Committee furnished names of manufacturers it would at once be suggested, in some quarters, that preference was given to certain firms.

It is a well-known fact that fairly large quantities of malachite green are manufactured in this country, the bulk of which is being sent direct to consumers, and it is just possible that the British firms mentioned are not prepared to supply agents.

We have been approached, from time to time, to manufacture certain dyestuffs, by actual consumers, and in every instance where forward contracts have been booked, we have satisfied our customers with the quality of our products and have agreed with them as to deliveries

If the British Chemical Trade Association is prepared to negotiate business on behalf of its members, we are in a position to manufacture malachite green crystals equal in every respect to goods of "American" origin.—Yours, etc.,

BOW BRIDGE DYES AND CHEMICAL WORKS,
(Joseph H. Deacon, *Sales Manager.*)

High Street, Stratford, E. 15,
October 22, 1919.

Obituary

MR. PETER GILSON.—While in London last week in connection with his interests as a glass bottle manufacturer, Mr. Peter Gilson, of Hunslet, Leeds, was knocked down by a motor-bus and so seriously injured that he died an hour later at the Westminster Hospital. Born in Glasgow eighty-seven years ago, Mr. Gilson spent his boyhood at Sandsend, near Whitby, where his father managed the alum works. At the age of fourteen he started to make his own way in the world, first at Hull, then at Leeds, where, in 1858, he became manager of a small chemical works. Fourteen years later he started business for himself as a glass bottle manufacturer. He was known as a shrewd and capable business man.

MR. DAVID RICHARDS.—The death is announced of Mr. David Richards, of London and Hirwain, South Wales. Mr. Richards was chairman and managing director of Sons of Gwalia, Ltd., chairman of the Maikop Deep Drilling Co., Ltd., the Plymouth Consolidated Gold Mines, Ltd., the Paquah Central Mines, Ltd., and director of the California Exploration Co., Ltd., the Ceylon Cocoa and Rubber Co., Ltd., and the Ontario Porcupine Goldfields Development Co., Ltd.

British Chambers of Commerce

THE following resolutions among others will be considered by the Association of British Chambers of Commerce at the quarterly meeting on October 29:—

PATENTS AND TRADE MARKS BILL.—That this Association of British Chambers of Commerce endorses the report of the special committee of the association appointed to consider the Patents and Designs Bill, 1919, and the Trade Marks Bill, 1919, and strongly urges that the amendments suggested be adopted by the House of Lords:

IMPORT OF DYESTUFFS.—That this Association demands the immediate removal of all restrictions on the importation of dyestuffs and the abolition of the Licensing Sub-Committee appointed by the Board of Trade to control such imports or the representation on such committee of the smaller manufacturers, of merchants and of the independent consumers.

THE FOLLOWING PLANS have been passed: The Anglo-American Oil Co., a pump house to works on Doncaster Road, Barnsley; the United Alkali Co., Ltd., a block plan of land at the west end of Glen Street, Hebburn; the British Oil and Cake Mills Ltd.; a soap factory at Foster Street, Hull; the Universal Oil Co., a sub-station at Oak Road, Hull; the Premier Oil Extracting Co., Ltd., an open shed at Stoneferry, Hull; the Hull Oil Manufacturing Co., Ltd., a recreation hut, at West Carr Lane, Stoneferry, Hull; Selby Chemical Works, buildings in the Holmes; and Yorkshire Dye Works, ten cottages at Selby.

Chemical Imports and Exports

The following figures show the value of the imports and exports of chemicals, drugs, dyes, and colours for the month, and for the eight months ended August 31, together with the increases or decreases as compared with the corresponding periods of 1917 and 1918 :—

MONTH ENDED SEPTEMBER 30.

	1917.	1918.	1919.
Imports	£2,871,219	£3,535,038	£2,125,285
A decrease of £1,409,753 as compared with 1918, and of £745,934 as compared with 1917.			
Exports	£1,944,337	£1,758,687	£2,075,842
An increase of £317,155 over 1918, and an increase of £131,505 as compared with 1917.			
Exports (Foreign and Colonial) ..	£181,917	£177,609	£478,973
An increase of £301,364 over 1918, and £297,056 over 1917.			

NINE MONTHS ENDED SEPTEMBER 30.

	1917.	1918.	1919.
Imports	£19,401,468	£30,018,144	£16,726,762
A decrease of £13,291,382 as compared with 1918, and of £2,674,706 in 1917.			
Exports	£17,535,753	£16,728,572	£20,847,079
An increase of £4,118,507 as compared with 1918, and £3,311,326 as compared with 1917.			
Exports (Foreign and Colonial) ..	£2,382,884	£2,144,795	£4,090,017
An increase of £1,945,222 over 1918, and £1,707,133 over 1917.			

I.—IMPORTS AND CONSUMPTION

CHEMICALS, DRUGS, DYES AND COLOURS :		QUANTITIES.						VALUE.					
		MONTH ended SEPTEMBER 30.			NINE MONTHS ended SEPT. 30.			MONTH ended SEPTEMBER 30.			NINE MONTHS ended SEPT. 30.		
		1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
CHEMICALS :								£	£	£	£	£	£
Acetic Acid (other than for table use)	*Cwts.*	6,396	7,592	4,601	82,278	70,316	54,974	49,930	38,892	14,426	511,052	458,477	224,056
Bleaching Materials	,,	889	—	—	2,263	68	2,450	1,957	—	—	3,998	195	10,865
Boracite, Borate of Lime, Borate of Magnesium, and Borax ..	,,	14,045	8,675	34,576	181,908	139,817	206,765	17,263	12,177	40,876	210,054	203,146	250,076
Brimstone	,,	137,000	102,049	986	177,475	857,113	115,775	56,205	84,532	1,452	84,782	460,491	103,010
Carbide of Calcium	,,	5,611	16,161	31,164	300,761	407,964	418,301	6,830	22,824	35,666	301,236	671,199	555,661
Coal Products, not Dyes ..	,,	1,709	428	1,818	35,577	13,402	32,295	25,693	4,159	1,228	431,915	141,680	97,284
Cream of Tartar	,,	2,197	2,089	460	27,094	32,037	12,695	20,473	33,714	4,678	226,458	486,103	184,308
Glycerine :													
Crude	,,	—	1,656	—	5,785	28,785	27,694	—	7,723	—	29,610	110,068	334,102
Distilled	,,	499	—	—	15,182	7,594	564	7,127	—	—	118,766	49,971	9,599
Potash Compounds :													
Saltpetre (Nitrate of Potash)	,,	25,393	39,519	2,000	277,445	297,662	123,879	54,966	89,229	4,250	586,516	641,623	252,212
Other Sorts	*Value £*	—	—	—	—	—	—	27,633	68,382	140,663	243,813	316,791	347,190
Soda Compounds	*Cwts.*	3,898	11,765	2,765	50,878	73,295	26,354	20,444	56,453	10,237	179,495	323,424	108,335
Tartaric Acid	,,	490	1,590	2,189	13,367	13,475	10,186	5,638	25,501	12,276	176,662	203,279	161,841
Unenumerated, including Acetate of Lime, Acetone, Muriate of Ammonia, and Sulphuric Acid	*Value £*	—	—	—	—	—	—	1,562,426	2,209,317	135,638	6,143,590	15,955,112	3,081,501
DRUGS AND MEDICINES :													
Bark, Peruvian	*Cwts.*	2,489	490	3,350	22,023	25,546	42,331	16,794	3,095	20,203	142,763	201,414	227,931
Quinine and Quinine Salts ..	*Ounces*	386,238	10,776	1,005,840	3,474,765	1,339,709	4,940,408	41,431	720	91,992	384,648	179,786	467,653
Unenumerated	*Value £*	—	—	—	—	—	—	181,188	198,424	294,128	1,747,492	2,023,110	2,563,246
DYE STUFFS (other than DYE WOODS) and SUBSTANCES used in Tanning or Dyeing :													
Dye Stuffs :													
Cutch	*Cwts.*	1,273	5,775	5,634	29,735	37,387	33,320	2,400	19,560	15,688	56,561	99,181	93,710
Dyes and Dye Stuffs obtained from Coal Tar :													
Alizarine and Anthracene Dye Stuffs ..	*Cwts.*	—	458	197	16	1,995	2,194	16	485	240	596	2,548	2,433
Aniline and Naphthalene Dye Stuffs	,,	4,157	2,367	5,103	41,331	34,922	34,888	126,452	85,486	132,000	1,306,863	1,232,606	1,088,639
Synthetic Indigo	,,	256	—	—	11,297	597	2,336	3,945	—	—	162,082	9,645	21,143
Other Coal Tar Dye Stuffs	,,	99	—	74	246	123	491	2,037	—	2,000	6,120	1,868	17,335
Extracts for Dyeing ..	*Value £*	—	—	—	—	—	—	77,780	63,913	43,081	845,029	548,366	488,034
Indigo	*Cwts.*	903	—	85	12,951	5,225	3,458	54,500	—	9,410	715,294	264,191	163,338
Unenumerated	,,	10,207	16,531	23,089	142,055	144,461	142,033	40,520	69,706	74,179	474,702	623,648	602,484
Tanning Substances :													
Bark, for Tanning	*Cwts.*	78,554	39,568	70,325	298,067	516,126	331,315	65,049	34,393	58,662	263,458	483,225	269,646
Extracts for Tanning ..	*Value £*	—	—	—	—	—	—	138,967	208,685	606,591	1,271,875	1,828,773	2,072,959
Gambier	*Cwts.*	16,927	15,054	15,311	87,973	89,422	63,478	40,626	47,199	41,651	230,146	302,855	169,443
Myrobalans	,,	49,296	56,461	27,433	349,091	527,282	250,220	50,881	62,222	21,074	316,855	564,780	185,720
Sumach	,,	1,736	32,741	4,441	70,016	110,312	47,677	1,502	34,033	4,176	53,473	114,444	50,160
Valonia	,,	10,500	—	2,410	21,640	166,631	83,499	23,625	—	2,824	45,905	243,082	108,995
Unenumerated	,,	124	44	48	2,982	7,804	25,098	455	92	364	6,147	17,190	37,929
PAINTERS' COLOURS AND PIGMENTS :													
Barytes	*Cwts.*	—	—	33,426	27,743	16,004	324,481	—	—	15,991	9,316	10,761	205,056
Nickel Oxide	,,	1,500	—	2,000	18,647	15,500	11,518	8,305	—	12,050	104,759	85,727	74,975
Red Lead	,,	—	—	—	2,345	—	387	—	—	—	5,492	—	816
White Lead	,,	1,735	—	20,149	38,891	4,597	84,209	3,440	—	49,913	83,978	9,448	209,480
Zinc Oxide	,,	11,489	5,557	4,102	165,829	59,139	109,208	35,038	17,384	14,941	500,781	181,962	310,502
Unenumerated	,,	20,739	6,075	49,644	249,437	146,880	337,973	73,261	22,467	122,325	663,780	403,993	723,597
TOTAL OF CHEMICALS, DRUGS, DYES, AND COLOURS								£2,871,219	3,535,038	2,125,285	19,401,468	30,018,144	16,726,762

IMPORTS AND CONSUMPTION—*continued.*

CHEMICALS, DRUGS, DYES AND COLOURS		QUANTITIES.						VALUE.					
		Month ended Sept. 30.			Nine Months ended Sept. 30.			Month ended Sept. 30.			Nine Months ended Sept. 30.		
		1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
Manures:													
Basic Slag	*Tons*	—	—	—	—	—	—	—	—	—	—	—	—
Bones for Manure (whether burnt or not)	,,	117	418	555	3,552	3,365	3,397	1,106	10,829	6,788	36,010	78,339	43,585
Guano	,,	—	—	—	2,551	—	62	—	—	—	26,865	—	696
Nitrate of Soda (Cubic Nitre)	,,	—	—	—	1,680	300	3,654	—	—	—	36,490	6,000	95,565
Phosphate of Lime, and Rock Phosphate	,,	36,495	29,061	22,423	153,348	364,659	260,005	136,587	141,504	67,716	670,134	1,516,142	968,741
Saccharin and mixtures containing Saccharin or other substances of like nature or use — Imports	*Ounces*	55,632	304,000	36,444	378,980	1,921,228	1,097,999	18,321	132,732	2,270	94,447	757,181	79,260
Saccharin and mixtures containing Saccharin or other substances of like nature or use — *Entered for Home Consumption*	,,	26,090	173,630	2,845	326,817	1,515,806	283,570	—	—	—	—	—	—
Soap:													
Soft Soap	*Cwts.*	—	—	340	—	—	642	—	—	859	—	—	1,494
Household and Laundry Soap in bars or tablets	,,	28	—	16,405	4,135	576	77,299	73	—	44,293	9,812	1,494	231,603
Polishing and Scouring Soap	,,	—	—	4,706	—	—	8,044	—	—	8,146	—	—	15,648
Powder	,,	—	—	597	54	16	4,257	—	—	1,421	396	112	8,044
Toilet	,,	54	3	2,738	1,004	1,337	12,034	1,219	69	27,694	8,627	15,801	161,027
Unenumerated	,,	—	—	30,054	8	—	98,157	—	—	63,748	43	—	199,989
Zinc, Crude, in Cakes	*Tons*	8,182	2,047	6,055	46,147	47,445	73,326	434,268	113,336	275,782	2,603,950	2,438,536	3,195,428
Zinc Manufactures	,,	445	72	465	3,605	2,153	2,650	45,254	7,373	30,151	345,306	223,721	197,602

II.—EXPORTS (PRODUCE AND MANUFACTURES OF THE UNITED KINGDOM)

								£	£	£	£	£	£
Bleaching Powder — To United States of America	*Cwts.*	—	—	—	—	—	1,040	—	—	—	—	—	900
,, Other Countries	,,	5,565	6,173	23,028	43,691	39,729	263,122	3,697	6,412	16,477	29,947	33,593	216,000
Total	,,	5,565	6,173	23,028	43,691	39,729	264,162	3,697	6,412	16,477	29,947	33,593	216,900
Coal Products, not Dyes:													
Aniline Oil and Toluidine	*Lbs.*	444,235	119,756	29,823	1,471,856	2,066,188	846,434	27,656	7,895	1,730	99,371	126,668	50,349
Anthracene	,,	228,801	—	133,419	1,983,489	2,240	1,039,082	606	—	610	6,526	40	4,867
Benzol and Toluol	*Galls.*	755,137	959,270	87,715	9,083,103	7,732,762	776,820	56,353	95,813	8,206	705,046	570,045	80,471
Carbolic Acid	*Cwts.*	12,086	15,005	7,197	109,128	73,265	100,993	93,571	41,222	15,027	348,145	190,320	240,494
Coal Tar, Crude	,,	—	117	5,720	1,896	251	20,062	—	23	1,866	359	55	7,821
,, Refined and Varnish	*Galls.*	438,195	28,247	244,363	2,527,641	780,587	2,340,710	9,559	861	9,810	60,684	22,775	96,463
Naphtha	,,	34,824	—	57,547	273,503	88,579	474,108	3,396	—	6,220	25,714	9,812	66,072
Naphthalene	*Cwts.*	20,616	14,537	4,305	167,806	163,538	55,303	33,623	23,881	6,477	199,460	238,593	74,069
Pitch	,,	315,226	244,016	326,228	4,626,616	6,076,905	9,574,291	29,368	35,847	49,801	274,567	634,927	1,261,634
Tar Oil, Creosote, &c.	*Galls.*	770,931	16,442	1,058,567	10,954,070	1,933,418	9,458,872	39,061	1,002	31,904	344,019	77,255	277,378
Other Sorts	*Cwts.*	21,939	7,019	13,633	320,073	121,177	172,695	25,144	11,663	14,563	304,882	169,485	222,591
Total Value	,,	—	—	—	—	—	—	319,337	218,207	146,184	2,368,772	2,038,975	2,382,209
Copper, Sulphate of	*Tons*	3,040	1,539	61	31,247	37,054	29,356	186,452	103,028	2,913	1,744,315	2,335,041	1,615,051
Dye Stuffs:													
Products of Coal Tar	*Cwts.*	16,860	7,106	6,664	59,264	58,866	64,641	155,734	88,699	91,468	837,442	870,664	908,952
Other Sorts	,,	5,741	849	4,878	56,526	15,016	32,705	20,473	5,511	16,937	213,840	87,972	121,088
Total	,,	22,601	7,955	11,542	115,790	73,882	97,346	176,207	94,210	108,405	1,051,282	958,636	1,030,040
Glycerine:													
Crude	*Cwts.*	—	1,860	310	21,773	15,651	5,421	—	5,770	630	72,304	51,631	25,878
Distilled	,,	10,678	3,560	5,590	59,567	34,110	37,011	51,602	16,330	30,534	271,247	156,307	223,633
Total	,,	10,678	5,420	5,900	81,340	49,761	42,432	51,602	22,100	31,164	343,551	207,938	249,511
Manures:													
Sulphate of Ammonia — To France	*Tons*	—	—	2,465	8,259	5,074	10,538	—	—	60,434	155,847	104,925	245,035
,, Spain and Canaries	,,	—	—	56	5,015	—	4,820	—	—	1,536	89,865	—	165,398
,, Italy	,,	—	—	70	1,004	1,851	2,717	—	—	1,957	21,304	45,671	91,599
,, Dutch East Indies	,,	—	—	1,609	6,480	—	7,938	—	—	39,832	119,648	—	202,232
,, Japan	,,	—	—	6,720	4,050	—	18,410	—	—	131,419	72,882	—	343,047
,, United States of America	,,	—	—	—	1,513	—	—	—	—	—	27,177	—	—
,, British West India Islands (including Bahamas) and British Guiana	,,	525	328	280	5,702	3,358	2,851	11,075	9,853	6,041	120,782	107,629	81,317
,, Other Countries	,,	4,166	165	409	19,190	2,087	9,024	81,999	2,938	9,311	359,071	53,037	260,298
Total	,,	4,691	49	11,609	51,213	12,370	56,318	93,074	12,791	250,530	966,576	311,262	1,398,926
Superphosphates	,,	250	530	819	1,947	1,273	2,692	1,753	3,330	6,838	11,586	8,163	24,193
Basic Slag	,,	70	71	2,112	1,473	201	9,101	250	227	8,124	5,597	629	35,743
Unenumerated	,,	741	2,874	3,533	17,963	25,800	25,516	8,864	32,378	50,825	170,189	276,649	349,172
Total of Manures	,,	5,732	3,968	18,073	72,596	39,644	93,627	103,041	48,726	316,317	1,153,948	596,703	1,808,074

II.—EXPORTS (PRODUCE AND MANUFACTURES OF THE UNITED KINGDOM)—*continued.*

CHEMICALS, DRUGS, DYES AND COLOURS:		QUANTITIES.						VALUE.					
		Month ended September 30.			Nine Months ended September 30.			Month ended September 30.			Nine Months ended September 30.		
		1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
MEDICINES, comprising DRUGS and MEDICINAL PREPARATIONS:													
Opium, dried and powdered in the United Kingdom	*Lbs.*	2,378	2,513	258	11,968	66,775	28,225	9,543	9,572	792	31,731	251,124	99,070
Quinine and Quinine Salts	*Ounces.*	104,646	40,042	123,997	1,253,080	310,329	1,101,651	13,892	7,084	25,353	171,920	52,366	178,054
Other Sorts	*Value £*	—	—	—	—	—	—	221,425	239,165	296,369	2,262,304	2,035,373	2,937,190
Total	,,	—	—	—	—	—	—	244,860	255,821	322,514	2,465,955	2,338,863	3,214,314
MURIATE OF AMMONIA	*Cwts.*	6,773	2,805	10,405	62,527	36,861	85,148	13,334	8,322	28,957	136,976	103,047	251,080
PAINTERS' COLOURS AND MATERIALS:													
Barytes	*Cwts.*	8,667	—	99	52,617	26,271	21,615	3,360	—	99	22,955	13,401	15,561
White Lead	,,	5,440	1,594	13,090	95,961	21,485	104,390	14,815	4,486	38,584	238,225	57,104	319,595
Zinc Oxide	,,	489	284	1,273	17,040	1,876	18,074	1,567	1,163	4,572	51,390	7,113	69,512
Unenumerated	,,	65,562	38,940	90,158	721,660	314,826	811,589	174,925	108,862	350,983	1,899,392	996,059	3,012,128
Total	,,	80,158	40,818	104,620	887,278	364,468	955,668	194,667	114,511	394,238	2,211,962	1,074,477	3,414,804
POTASH COMPOUNDS:													
Saltpetre (Nitrate of Potash), British prepared	*Cwts.*	753	2,224	3,728	7,581	12,511	27,914	2,464	7,114	10,563	22,977	39,899	84,680
Chromate and Bi-chromate of Potash	,,	901	42	1,752	6,007	2,301	6,520	9,160	471	15,796	45,117	25,904	61,898
Other Sorts	*Value £*	—	—	—	—	—	—	3,036	1,938	7,172	51,086	22,431	39,972
Total	,,	—	—	—	—	—	—	14,660	9,523	33,531	119,180	88,234	186,520
SODA COMPOUNDS:								£	£	£	£	£	£
Soda Ash	*Cwts.*	140,099	324,497	196,082	2,514,764	2,301,531	2,601,324	45,461	115,779	61,098	756,215	738,066	862,483
,, Bicarbonate	,,	23,876	42,563	40,253	374,896	325,595	391,874	8,538	19,732	18,475	131,747	155,002	192,479
,, Caustic	,,	47,928	112,795	106,633	332,463	462,234	714,500	20,767	164,486	106,893	429,054	716,555	922,873
,, Chromate and Bichromate	,,	6,649	4,505	6,973	71,666	57,785	51,009	23,598	16,334	19,855	222,298	191,973	142,489
,, Crystals	,,	2,788	459	5,798	74,211	12,291	160,683	1,287	173	1,852	22,940	5,561	53,689
,, Sulphate (Saltcake)	,,	50,137	80,666	29,029	355,372	411,707	228,108	7,899	12,886	4,876	49,695	71,706	42,726
,, Other Sorts	,,	34,441	60,163	60,822	417,013	435,915	429,931	20,614	77,875	65,770	333,157	539,522	529,967
Total	,,	305,909	625,648	445,590	4,140,385	4,007,058	4,577,429	187,344	407,235	278,819	1,945,086	2,418,985	2,746,706
SULPHURIC ACID	*Cwts.*	1,092	339	1,363	18,657	19,520	28,876	1,656	408	2,601	21,522	26,867	30,617
TARTARIC ACID	,,	2,244	84	723	12,747	2,785	6,876	33,436	1,446	11,795	184,808	44,555	112,654
CHEMICALS, other sorts	*Value £*	—	—	—	—	—	—	413,144	468,708	381,897	3,758,449	4,462,658	3,586,639
		—	—	—	—	—	—	1,944,337	1,758,687	2,075,842	17,535,753	16,728,572	20,847,079

III.—EXPORTS, FOREIGN AND COLONIAL MERCHANDISE

CHEMICALS:								£	£	£	£	£	£
Boracite, Borate of Lime, Borate of Magnesium and Borax	*Cwts.*	—	—	680	1,215	865	5,674	—	—	1,329	1,822	2,762	10,049
Coal Products, not Dyes	,,	—	—	50	1,328	305	943	—	—	157	11,195	5,210	15,568
Cream of Tartar	,,	827	1,075	570	5,405	9,829	4,359	7,639	16,391	6,723	47,858	134,574	69,836
Glycerine:													
Crude	,,	—	—	—	—	—	10	—	—	—	—	—	150
Distilled	,,	—	—	—	—	—	—	—	—	—	—	—	—
Potash Compounds:													
Saltpetre (Nitrate of Potash)	,,	—	7,860	8,380	33,092	48,071	14,261	—	17,300	16,625	67,258	101,935	28,953
Tartaric Acid	,,	219	21	378	2,330	566	1,721	3,628	355	6,561	35,379	8,810	30,523
Of all other Sorts	*Value £*	—	—	—	—	—	—	28,211	15,199	44,384	386,630	469,232	1,255,351
DRUGS AND MEDICINES:													
Bark, Peruvian	*Cwts.*	418	3	3,159	11,246	13,328	21,663	3,671	42	24,172	76,322	130,627	160,035
Quinine and Quinine Salts	*Ounces*	31,691	439,338	558,247	110,691	1,505,930	2,101,339	4,467	55,051	59,357	16,798	181,557	240,164
Unenumerated in Import List	*Value £*	—	—	—	—	—	—	54,217	33,618	158,085	597,370	483,302	1,324,696
DYE STUFFS (other than Dye Woods) and SUBSTANCES used in TANNING or DYEING:													
Dye Stuffs:													
Cutch	*Cwts.*	—	1,171	3,882	20,283	4,655	25,185	—	3,108	10,352	45,397	13,644	72,436
Extracts for Dyeing	*Value £*	—	—	—	—	—	—	29,990	520	6,016	104,671	89,922	126,370
Indigo	*Cwts.*	282	346	502	9,324	5,030	972	15,523	19,850	20,406	494,836	249,748	42,296
Tanning Substances:													
Bark for Tanning	*Cwts.*	1,921	—	13,317	13,711	4,992	106,495	1,420	—	13,144	9,562	5,398	96,657
Extracts for Tanning	*Value £*	—	—	—	—	—	—	7,320	1,593	25,517	102,102	1,683	185,744
Gambier	*Cwts.*	—	2	1,534	9,911	658	14,150	—	10	4,154	24,503	2,107	33,267
Myrobalans	,,	—	—	21,739	761	4,460	79,575	—	—	19,190	556	4,749	78,152
Sumach	,,	—	—	40	214	—	2,836	—	—	48	214	—	3,240
Valonia	,,	—	—	17	—	—	8,931	—	—	30	—	—	16,021
Unenumerated	,,	—	—	700	2,285	—	11,564	—	—	1,080	2,283	—	14,415
PAINTERS' COLOURS AND PIGMENTS	,,	633	127	1,967	23,005	1,494	11,083	5,530	772	4,665	71,964	9,169	41,013
TOTAL OF CHEMICALS, DRUGS, DYES AND COLOURS £								181,917	177,609	478,973	2,382,884	2,144,795	4,090,017

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

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Mixture gas ratios and their effect upon gas engine economy. W. A. Tookey. *Gas World*, October 18, 288-289.

The use of gas in industry. Scope for gas-heated boilers. W. A. Tookey. *Gas World*, October 18, 290-291.

GLASS. The British glassware industry. *Engineering*, October 17, 517-518. Editorial notes on the position of the industry.

INSULATORS. The thermal conductivities of insulators in relation to the lagging of steam pipes. R. Thomas. *J. Soc. Chem. Ind.*, October 15, 357-360T. A valuable paper giving results of determinations of conductivities of the commonly employed insulators.

MUSTARD GAS. The history of mustard gas. A. G. Green. *J. Soc. Chem. Ind.*, October 15, 363-364R.

POTASH. A new potash supply. E. G. Bryant. *J. Soc. Chem. Ind.*, October 15, 360-362T. An account of the Prieska deposits of potassium nitrate (South Africa).

STARCH. The manufacture of farina from potatoes. H. W. Richards. *J. Bd. Agric.*, October, 700-703. An illustrated description of the King's Lynn mills is given.

SULPHURIC ACID. The manufacture of sulphuric acid by the Grillo process. R. Curtis. *J. Soc. Chem. Ind.*, October 15, 369-371R. The working and costs of manufacture in Government plants are dealt with.

French

AMMONIA. Study of the catalytic oxidation of ammonia. P. Pascal and E. Descarrière. *Bull. Soc. Chim.*, September, 489-507. Experiments have been made to determine the influence of temperature, concentration of ammonia, and nature and surface of catalyst on the oxidation process.

ANALYSIS. Micro-chemical reactions of thiosulphuric acid. A. Bolland. *Comptes rend.*, October 13, 651-654.

CARBON DIOXIDE. Separation of pure carbon dioxide by solidification from gaseous mixtures. V. Crémieu. *Comptes rend.*, October 13, 654-655. Chemically pure carbon dioxide in solid form, free from radium emanation, has been prepared from natural gaseous mixtures rich in carbon dioxide.

METALS. New electrolytic process for cleaning and oxidising metals. L. Revillon. *Rev. Mét.*, July-August, 257-268. A process is described for cleaning and colouring metals, using alkaline electrolytes.

PLANT. The industrial use of extremely high pressures. G. Claude. *Comptes rend.*, October 13, 649-651. Notes on some requirements of plant for withstanding pressures up to 1,000 atmospheres.

SILICIDES. The limits of combination of silicon with some metals of the iron group. A. Sanfourche. *Rev. Mét.*, July-August, 238-245. The limits have been determined in the cases of iron, manganese, nickel, and cobalt.

Copper-silicon alloys. A. Sanfourche. *Rev. Mét.*, July-August, 246-256. The limit of combination of silicon with copper has been determined.

American

POISON GAS. Superpalite. H. P. Hood and H. R. Murdock. *J. Phys. Chem.*, October, 498-512. The preparation and properties of superpalite (diphosgene, trichlormethylchlorformate) are described.

German

ANALYSIS. Gas-washing flasks and absorption apparatus. F. Friedrichs. *Z. angew. Chem.*, August 12, 252-256. A critical study of the different types of apparatus, with recommendations as to the best features.

Report on the progress of the analysis of metals in 1917-1918. T. Döring. *Chem. Zeit.*, August 26, September 6, 13, and 20, 545-547, 578-579, 601-603, 626-628. A useful review of the literature.

FATS. Technical hardening of fats with a nickel catalyst. L. Ubbelohde and T. Svanoe. *Z. angew. Chem.*, August 19 and 26 and September 2, 257-262, 269-272, 276-280. The results are recorded of numerous experiments on cotton and whale oils under different conditions.

FUEL. Coke briquettes. Behr. *J. Gasbeleucht*, September 20, 552. A short account of experiences in making and using this form of fuel.

Strehlenert's Sulphite fuel process. M. Müller. *Papierfabr.*, August 29, 917-919. A description is given of the manufacture of fuel from sulphite-cellulose waste liquors, and its uses.

GAS. Tests with vertical retorts of the Dessau type. K. Bunte. *J. Gasbeleucht*, September 20, 548-552. Concluding part of paper already noted (CHEMICAL AGE, p. 502).

Evaluation of combustible gases on the basis of their inflammability. M. Hofsäss. *J. Gasbeleucht*, September 20, 541-548. Methods and apparatus for testing gases on the inflammability basis are suggested.

MINERAL OILS. Corrosion of apparatus used for distilling mineral oils. M. Freund. *Chem. Zeit.*, September 9, 587-588.

ORGANIC CHEMISTRY. Over-estimation of the value of aromatic and under-estimation of that of aliphatic organic chemistry. *Chem. Zeit.*, September 4, 573-574.

POTASH. Production of potassium nitrate and ammonium sulphate from crude potash salts. H. Hampel. *Chem. Zeit.*, September 18, 617-619. A cyclic process, commencing with potassium sulphate, is described.

VEREIN DEUTSCHER CHEMIKER. General meeting at Würzburg, September 4—7. T. Diehl. *Chem. Zeit.*, September 11 and 16, 594-599, 609-614. A report of the meeting of the Verein, with abstracts of papers read.

Miscellaneous

ANALYSIS. New method of separating aluminium and vanadium. P. Wenger and H. Vogelson. *Helv. Chim. Acta*, October 1, 550-553. An analytical method of separation is described, also its application to the separation of iron, aluminium, and vanadium.

Amalgamated copper electrodes in electrolytic analysis. J. Alemany. *Anal. Fis. Quim.*, June, 174-188.

Electro-analysis of copper without platinum electrodes. J. Guiteras. *Anal. Fis. Quim.*, July, 200-216.

Electro-analysis of nickel without platinum electrodes. E. Fernandez-Espina. *Anal. Fis. Quim.*, July, 190-205.

PETROLEUM. Distillation of sodium stearate and oleate under reduced pressure, and the origin of petroleum. A. Pictet and J. Potok. *Helv. Chim. Acta*, October 1, 501-510. An examination of the hydrocarbons produced furnishes evidence favouring Engler's theory of the origin of the acyclic constituents of petroleum.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

Abstracts of Complete Specifications

120,378. Nitric Acid, Manufacture of Concentrated. Norsk Hydro-Elektrisk Kvaelstofaktieselskab, Solligatan 7, Christiania. International Convention date (Norway), October 30, 1917.

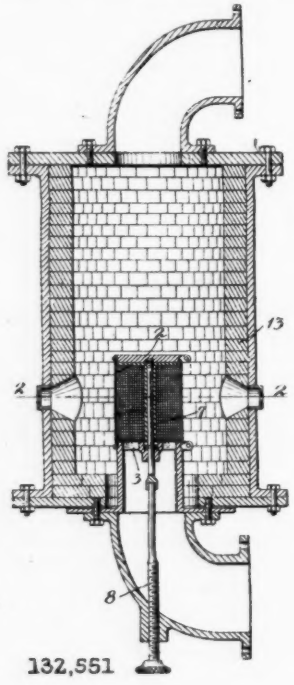
A mixture of nitrogen peroxide and water or dilute nitric acid is passed downward through absorption towers in succession. Compressed oxygen is also passed downward through the towers in succession, but in the reverse order to that of the liquid. The oxygen thus comes into contact first with the most concentrated acid and then with the less concentrated acid. The pressure should be about 10 atmospheres.

123,735. Distillation of Liquids, Apparatus for the Fractional. Société d'Etudes Chimiques, 8, Quai du Cheval Blanc, Geneva. International Convention date (Switzerland), February 20, 1918.

A dephlegmator is filled with contact bodies such as small cylinders of wire gauze, is placed in a slightly inclined position within a boiler, and its lower and upper ends are connected to a distilling apparatus and a condenser respectively. The boiler contains a liquid which is selected according to the temperature required, and the temperature of the dephlegmator is maintained constant at any pre-determined point by keeping the liquid at its boiling point under pressure by means of an internal steam heating coil. The temperature is varied by varying the pressure within the boiler by means of an adjustable safety valve. The upper part of the boiler contains a tubular condenser, to condense the vapour and return it to the boiler. The apparatus is suitable for separating the three isomers of xylene.

132,551. Ammonia, Process and Apparatus for Oxidising—to Form Oxides of Nitrogen and Nitric Acid. L. C. Jones, 240, De Witt Street, Syracuse, N.Y., U.S.A., and C. L. Parsons, 3,414, Newark Street, Washington, D.C., U.S.A. Application date, April 30, 1918.

Relates to the construction of the contact body whereby its temperature is maintained by the heat of the reaction. A sheet of fine gauze constructed of platinum, preferably coated with platinum black, or of platinum-palladium, is wound evenly round the peripheries of a disc 2 and spider 3, forming four complete layers. The layers are secured together at intervals of one inch over the surface to ensure contact at every point. The gauze cylinder is clamped by rings at each end, and mounted on a rod 7, so that it can be stretched by the screw 8. The cylinder is enclosed in a casing 13 of enamelled brick, which is not affected by oxides of nitrogen, and acts as a heat reflector. This construction of the contact body prevents loss of heat by radiation and by transference to the reaction products, and renders pre-heating of the gaseous mixture unnecessary.



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132,557. Acetaldehyde Process of Manufacturing. H. W. Matheson, Shawinigan Falls, Quebec, Canada. Application date, June 18, 1918.

A large excess of acetylene is passed through water containing 6 per cent. of sulphuric acid and a small proportion of mercuric oxide. The temperature is maintained at 60° to 65° C., and the pressure at about 2 lb. per square inch above atmospheric. Water, acid, and mercuric oxide are added periodically to maintain a constant proportion of these substances. The aldehyde is carried out of the reaction vessel by the excess of acetylene.

132,558. Acetic Acid, Manufacture of. H. W. Matheson, Shawinigan Falls, Quebec, Canada. Application date, June 18, 1918.

A vessel lined with aluminium is charged with acetaldehyde and about 0.5 per cent. of manganese acetate or other catalyst. The aldehyde is raised to 20° to 25° C. by a steam coil, and large quantities of air are passed through the liquid. The pressure is allowed to rise to 75 lb. per square inch, and the temperature to 65° C. The oxygen is entirely absorbed from the air. The vapour is condensed at the same pressure, and returned to the reaction vessel. The temperature of the reaction vessel is kept down to the required limit by circulating water through a cooling coil.

132,571. Ammonia, Burner for the Oxidation of. E. B. Maxted, 63, Highgate Road, Walsall, Staffs., and T. A. Smith, Westmount, Highgate, Walsall, Staffs. Application date, August 12, 1918.

Ammonia and oxygen or oxygenated air are burned in an annular reaction space between two tubes of iron. The gases are admitted at one end and discharged at the other, and a spiral baffle is provided in the annular space. The outer tube is wrapped with asbestos, and heating is effected internally by means of a flame. The annual space is preferably 1 mm. to 2 mm. in width.

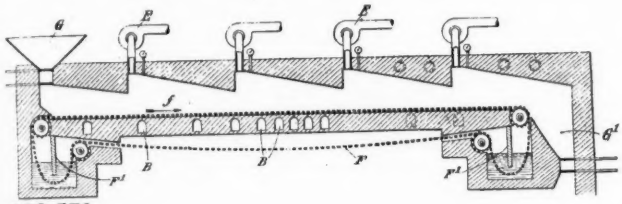
132,572. Peat, Means and Method of Treating—for Obtaining Carbonaceous Material for Decolourising Purposes. J. W. Leadbetter, 2, Morley Road, Doncaster. Application date, August 13, 1918.

Peat is dried, ground or finely divided, and mixed with ground quicklime. The peat is thereby disintegrated, and the mixture is heated in trays in a retort until the peat is carbonised. The residue is boiled in water containing hydrochloric, hydrofluoric, or sulphuric acid, to remove the ash, &c., and the material is mixed with 25 to 50 per cent. of fuller's earth, hydrated aluminium silicate, kieselguhr, or other earth containing nearly pure silica. The mixture is then dried, and is suitable for decolourising sugar, vegetable, mineral, or other oils, such as cotton-seed oil, paraffin wax, and other materials.

132,576. Coal, Shale, and other like Substances, Furnaces for Distillation of. F. A. Anderson, 5, Auriol Mansions, Kensington, London, W. 14; M. Deacon, Chase Cliff, Whatstandwell, near Matlock; and N. P. W. Brady, 7, St. Helen's Place, London, E.C. 3. Application date, August 14, 1918.

Material is fed from the hopper G to the conveyor F, which travels along the hearth in the direction of the arrow *f*. The hearth

is heated by means of a sinuous passage shown in section at B, through which hot gases from a burner are passed. The passage B has its windings arranged more closely together at the centre of the hearth, as shown, and the hot gases enter at that end, thereby ensuring the hottest zone at the centre of the hearth, and lower temperatures at the two ends. The return portion of the conveyor

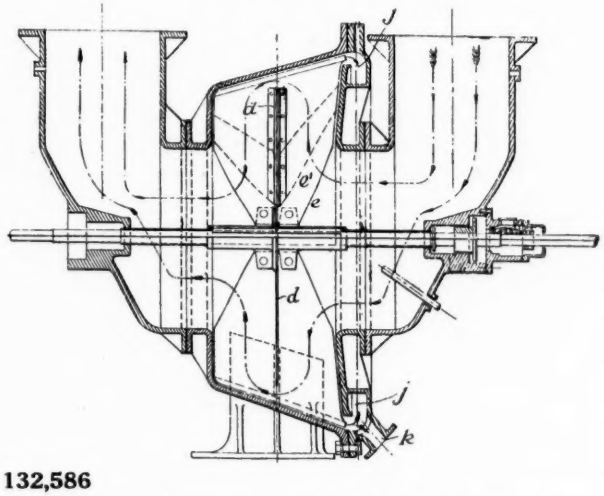


132,576

is outside the apparatus, and its entrance and exit are made through water seals F^1. The residue is discharged by the hopper G^1. The distillates given off at successively higher temperatures as the material moves from left to right are collected in pockets in the roof, and are withdrawn by separate exhaust fans E.

132,586. Gas Cleaning Apparatus. A. J. Liversedge, 20, Essex Street, Strand, London, W.C. 2, and Dr. W. B. Davidson, 4, Kaffir Road, Edgerton, Huddersfield. Application dates, August 27, 1918, and January 17, 1919.

Apparatus for separating suspended solid matter from gases comprises a rotating structure or fan, mounted on an axle *b* and arranged in a casing *a*. The fan is composed of a large number of vanes *e*, e^1, e^2 . . . which are also parallel to the axis *b*, and are attached to a central transverse disc *d*. The outer edge of the



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fan is conical, as shown, and the outer edge of each vane is turned over to provide a channel-shaped gutter *h*. The gas to be cleaned passes through the apparatus from the inlet I to the outlet O, and in passing through the fan the greater centrifugal force of the solid particles causes them to be deposited on the vanes *e* and transferred to the gutters *h*. The collected matter passes along the gutters to the larger diameter of the cone *a*, and is then discharged into the trough *j*. The channel-shaped gutters *h* may be formed separately and attached to the vanes. In an alternative form the gutters are omitted, and a hollow truncated cone is attached to the outer ends of the vanes.

132,622. Cyanamide, Process for the Production of. F. Gros and Bouchardy, 39, Rue Cambon, Paris. International Convention date (France), November 3, 1917.

A charge of powdered calcium carbide is placed in shallow trays, which are conveyed in succession through a tunnel furnace. The carbide is heated at the entrance end of the furnace only, preferably by electrical means, by radiation from the roof, and nitrogen is passed through in the opposite direction. The carbide is thereby rapidly heated, and a large surface is subjected to the action of nitrogen without agitation of the charge. The calcium cyanamide formed is rapidly cooled as it moves into the cooler end of the furnace. Air locks are provided at each end of the furnace.

132,635. Electric Furnaces. T. A. D. Lawton, Essington House, near Wolverhampton, and J. Hampton, The Elms, Wrotsley Road, Tettenhall, Staffs.

An electric resistance furnace of the type in which graphite or carbon bars are arranged around a heating chamber is designed so that the maximum heat is conveyed into the heating chamber and the minimum heat is radiated. Each bar is partly rectangular in section, but the two opposite sides are partly bevelled off so as to form a knife edge opposite the rectangular portion. The rectangular parts are all placed in contact with the wall of the heating chamber, and the knife edges are in contact with the surrounding enclosure.

132,661. Sulphuric Acid, Process for Recovering Unoxidised Sulphur in the Contact Manufacture of. British Dyes, Ltd., J. Turner, and Dr. W. B. Davidson, all of St. Andrew's Road, Huddersfield. Application date, November 1, 1918.

The gas issuing from the contact plant is scrubbed with a suitable solution, such as waste sodium sulphite from the manufacture of synthetic phenol, or carbonate of soda, or milk of lime. The resulting solution is treated with hydrochloric or sulphuric acid, which may be waste weak acid products, or materials containing sulphuric acid, such as nitre cake. The mixture is heated by a steam coil and then agitated, when sulphur dioxide is liberated, passed through a condenser to remove water vapour, and finally led into the gas which is being passed into the contact chambers.

132,704. Sulphuric Acid, Concentration of. F. W. Howorth, London. (*From Norsk Hydro-Elektrisk Kvaelstofaktieselskab, Solligatan 7, Christiania.*) Application date, January 22, 1919.

Hot nitrous gas above 600° C. is mixed with cool moist exhaust gas from the concentration apparatus to bring the temperature down to 500° to 600° C., and the mixed gas is passed through a tower in contact with the sulphuric acid which is thus concentrated. The exhaust gas is passed through a condenser, where a very dilute nitric acid is condensed, and the gas is then introduced into the absorption system for the nitrous gases.

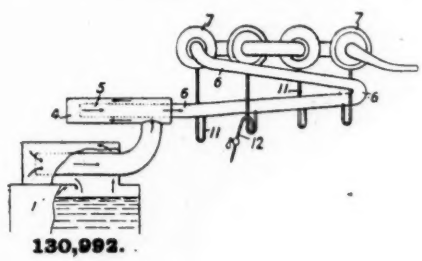
132,744. Coal and like Substances, Furnaces for the Distillation of. F. A. Anderson, 5, Auriol Mansions, Kensington, London, W. 14; M. Deacon, Chase Cliff, Whatstandwell, near Matlock; and N. P. W. Brady, 7, St. Helen's Place, London, E.C. 3.

The apparatus is similar to that described and illustrated in connection with No. 132,576 (*above*). The invention consists in making the gas-collecting pockets in the roof with their top surfaces sloping in the direction of travel of the material below, so that any condensed vapour collecting on the surface may run forward. The pockets are made with sharp dividing edges as shown. An exhaust fan is provided for each pocket, and the suction pressure is maintained the same in all pockets, with the aid of pressure gauges.

International Specifications Open to Inspection

130,992. Fractional Distillation. E. A. R. Chenard, Cognac, Charente, France. International Convention date, August 5, 1918.

Vapour from a still 1 passes through a series of heat interchanging elements, each consisting of concentric tubes 4, 5. The vapour passes through a series of condensers 7, each of which has a chamber in which the vapour expands, and a filter to retain the



130,992.

liquid particles formed thereby. The liquid flows back through the zigzag pipe 6, and then through the heat interchangers 4, 5, where heat is received from the vapour which is passing through them from the still 1.

131,269. Furnaces and Kilns. C. Candlot, 37, Rue du Roche, Paris. International Convention date, August 10, 1918. Addition to 119,235.

In the furnace or kiln described in 119,235 (see The Chemical Age of October 11), in which material, after treatment in a vertical chamber, is ground between rotating cones, each having its axis horizontal and its apex at the axis of the chamber, the central common bearing is dispensed with, and the cones are mounted on shafts or spindles projecting inwards from the wall of the chamber. The points of the cones are deeply serrated. An annular conical ring is arranged just above the cones to direct the material from the periphery of the kiln on to the cones. The ring may be rotating or fixed.

131,272. Sodium Hydrate. Dorr Co., 101, Park Avenue, New York. International Convention date, August 16, 1918.

Spent liquor from pulp digesters is evaporated and calcined, and the soda ash is treated with slaked lime or with quicklime and a slaking liquid. The mixture is ground, coarse material is separated and the mixture agitated in a series of reaction vessels heated to 95° C. The resulting alkali is decanted from the calcium carbonate, and passed to a storage vessel connected to the pulp digesters. A method of separating the alkali from the calcium carbonate in three decanting vessels is described, the slaking liquid for the quicklime being obtained from one of them.

131,273. Solvents, Recovering. E. I. Du Pont de Nemours & Co., Wilmington, Del., U.S.A. International Convention date, August 8, 1918.

The solvent is absorbed in a current of air, which is then passed through a coal-tar distillate boiling at 240° to 350° C. The solvent vapour is absorbed, and is then recovered by blowing air or steam through the heated liquid. The process is applicable to the recovery of ethyl, propyl, butyl, and amyl acetates, and a suitable apparatus is described in detail.

131,289. Alkali Dichromates. Soc. Industrielle de Produits Chimiques, 10, Rue de Vienne, Paris. International Convention date, August 13, 1918.

Alkali chromate is treated with carbon dioxide, alkali bicarbonate and dichromate being produced. The bicarbonate is filtered off, and the mixture of unchanged chromate and dichromate treated with slaked lime. Calcium chromate is precipitated from the dichromate, and this is then decomposed by alkali bisulphate or sulphuric acid to produce alkali dichromate or chromic acid. The unchanged chromate is again subjected to the above cycle of operations.

131,301-2-3. Fatty Acids. Pardubitzer Fabrik der Akt.-Ges. für Mineralöl-Industrie vorm. D. Fanto & Co., Pardubitz, Austria. International Convention dates, September 2 1916, November 17, 1917, and January 29, 1918.

131,301. Air is passed through paraffin wax at 115° to 125° C. for a lengthy period, the heat of the reaction being sufficient to maintain the temperature. The reaction is accelerated by the addition of previously oxidised paraffin wax. The products are substitutes for vegetable or animal fatty acids, while a substance suitable for use in varnishes is produced by prolonged passage of air at a higher temperature.

131,302. (*Addition to* 131,301.) The reaction is accelerated by the addition of catalysts, such as metals or metallic oxides or salts, or acids, such as oleic, naphthenic, or colophonic.

131,303. (*Addition to* 131,301). The reaction may take place under increased or reduced pressure, and oxygen, ozonised air, or ozone may be used in place of air.

Latest Notifications.

133,666. Hydrogenation and apparatus therefor. Dayton Metal Products Co. October 5, 1918.

133,667. Fuel for Internal Combustion Engines. Dayton Metal Products Co. October 4, 1918.

133,709. Liquid Fuel. U.S. Industrial Alcohol Co. November 28, 1917.

Specifications Accepted, with Date of Application

120,205. Liquids, Process for Evaporating. E. Morterud. October 26, 1917.

126,628. Zinc Sulphide and Barium Sulphate, Process for the Conjoint Manufacture of. P. Desachy. October 19, 1917.

127,555. Thorium Compounds, Extraction and Purification of. Lindsay Light Co. May 29, 1918.

132,815. Cellulose, or Material containing Cellulose, Manufacture of Solutions of. A. G. Bloxam (*Zellstofffabrik-Waldhof*). October 12, 1917.

132,842. Potassium Permanganate, Process of Manufacture of. C. Dreyfus and J. J. Bloch. August 24, 1918.

132,855. Potash from Potash-bearing Minerals, Method of Extracting—and the Manufacture of the Residual Products of such Method of Conversion into Cement. A. C. Auden. September 23, 1918.

132,882-3. Nitrates from Ammonia, Ammonium Compounds, or Organic Nitrogen Compounds by means of Bacteria, Processes for the Production of. C. T. Thorssell and H. L. R. Lunden. September 26, 1918.

132,885. Rotary Furnaces. W. O. Garbutt. September 26, 1918.

132,893. Liquids, Process for Evaporating. E. Morterud. October 26, 1917.

132,923. Fuming Sulphuric Acid, Continuous Process for the Production of High Strengths of. British Dyes, Ltd., J. Turner, and W. B. Davidson. November 1, 1918.

132,947. Colloidal Matter from Liquids, Effecting the Recovery or Separation of. T. W. Barber. December 2, 1918.

132,960. Fuel Oils. F. Tinker. December 24, 1918.

132,996. Cellulose Nitrates and Celluloid, Production of Solutions of. R. Gilmour and W. Dunville & Co. December 17, 1918.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 4, Queen Anne's Gate Buildings, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref. No.
Switzerland (Zurich)	Pharmaceutical Goods	902
Brazil (Rio de Janeiro)	Chemicals: Cement	907

Government Contracts

The following contracts were placed by the Government during September:—

Ministry of Munitions (War Office Contracts).

Medicines: Burgoyne, Burbidges & Co., Ltd., London, E.; R. W. Greeff & Co., London, E.C.; Parke, Davis & Co., Hounslow.
Oils: Silvertown Lubricants, Ltd., London, E.
Soap: J. Knight, Ltd., London, E.; Price's Patent Candle Co., Ltd., London, S.W.

India Office: Store Department.

Carbonate: T. Morson & Son, London, W.C.
Carbolic Acid: Bowdler & Bickerdike, Church.
Citric Acid: Kemball, Bishop & Co., Bromley-by-Bow.
Potash Bromide: Whiffin & Sons, Battersea.
Quinine: Howards & Sons, Ilford.

Crown Agents for the Colonies.

Cement, Portland: Associated Portland Cement Manufacturers Ltd., London, E.C.
Oil, Linseed: J. L. Seaton & Co., Ltd., Hull.
Paint, White Lead: Hubbuck & Son, Ltd., London, E.C.

H.M. Prison Commission.

Drugs and Sundries: Baiss Bros. & Co., Ltd., Bermondsey, S.E.
Oilman's Stores: J. F. Percival, Ltd., Blackfriars, S.E.
Soap, Yellow: Prices' Patent Candle Co., Ltd., Battersea, S.W.
Soap, Carbolic: J. Knight, Ltd., Silvertown, E.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, October 23, 1919.

THE recent activity in the chemical trade is well maintained both on home and export account. Values are very steady, and some products are now becoming relatively scarce for near delivery.

Export trade also continues to be very active, especially for the Continent and the Far East.

General Chemicals

ACID ACETIC is slightly lower in price, mainly owing to some fairly large arrivals. There is a good demand.

ACID OXALIC is lower in price, and is moving off well.

ALUMINIUM SULPHATE is in better request, and is rather scarce on the spot.

AMMONIUM SALTS are all quite active.

BLEACHING POWDER.—There is a little more activity in this article, with a better demand for export.

COPPER SULPHATE is still inactive, but there is slightly better inquiry.

EPSOM SALTS are moving off rapidly, and makers now are, on the whole, well occupied.

FORMALDEHYDE.—This material is extremely scarce, and the price is again higher.

LEAD ACETATE is in good demand, and price is very firm.

POTASSIUM BICHROMATE is in much request for export.

POTASSIUM CARBONATE is unchanged in value, and it is understood that there are some supplies, either landing or near at hand.

POTASSIUM PRUSSIATE is slow of sale and market easy.

SODIUM ACETATE is moving off better, and price is steady.

SODIUM BISULPHITE.—Makers are all fully occupied, and near delivery is impossible to obtain. Price is very firm.

SODIUM CAUSTIC.—Active business has been again transacted in this product at hardening prices.

SODIUM HYPOSULPHITE is unchanged in value and fairly scarce on the spot.

SODIUM NITRITE is scarce with change in value.

SODIUM SULPHIDE is a shade easier, with only a moderate business passing.

TIN SALTS are without change.

Coal Tar Intermediates

ANILINE OIL.—Quite important business has been passing in this article, chiefly for export. The market for prompt and forward delivery is much firmer.

ANILINE SALT.—The present high prices are still maintained, as the position of securing supplies of hydrochloric acid is no easier.

ANTHRANILIC ACID.—The American quotation has been materially reduced recently, and we understand that a fair amount of business is passing on the present basis.

BETANAPHTHOL.—Prices for spot delivery remain steady, and makers seem disinclined to make quotations for 1920 delivery.

ORTHOTOLUIDINE.—Supplies of English make are now available at reasonable prices.

Heavy Coal Tar Products

The market for all coal tar products remains firm.

BENZOL.—Supplies are scarce, and prices very firm at about 2s. 1d. on rails, but business is difficult to arrange.

CRESYLIC ACID remains steady at 2s. 5d. per gallon for 97/99 per cent., and 2s. 3d. per gallon for 95/97 per cent., both prices naked at works.

CREOSOTE OIL is in fair demand, and the price is 5¾d. to 6d. in the North and 6¾d. to 7¼d. in the South.

NAPHTHALENE is also in fair demand, with prices at about £7 10s. per ton for crude and £20 per ton for refined.

SOLVENT NAPHTHA is very firm, and makers are fully booked. Business is being done at 2s. 5d. at works in the Midlands and 2s. 7d. in London. For 1920 business, 2s. 6d. at works is quoted.

HEAVY NAPHTHA.—The price remains the same at about 2s. 2d. per gallon, f.o.r. makers' works.

PITCH.—There is no change.

Sulphate of Ammonia

There is no change.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone, pure	ton	95	0	0	to	97	0	0
Acid, Acetic, glacial, 99-100%	ton	77	10	0	to	80	0	0
Acetic, 80% pure	ton	65	0	0	to	67	10	0
Carbolic, cryst. 39-40°	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	4	4	to	0	4	5
Lactic, 50 vol.	ton	70	0	0	to	72	10	0
Lactic, 60 vol.	ton	85	0	0	to	87	10	0
Oxalic	lb.	0	1	1	to	0	1	1½
Pyrogallic, cryst.	lb.	0	11	6	to	0	11	9
Tannic, commercial	lb.	0	3	0	to	0	3	3
Tartaric	lb.	0	3	3	to	0	3	4
Alum, lump	ton	17	15	0	to	18	0	0
Aluminium, sulphate, 14-15%	ton	14	10	0	to	15	0	0
Aluminium, sulphate, 17-18%	ton	18	0	0	to	18	10	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, carbonate	lb.	0	0	6½	to		—	
Ammonia, muriate (galvanisers)	ton	44	0	0	to	45	0	0
Ammonia, nitrate	ton	50	0	0	to	55	0	0
Ammonia, phosphate	ton	115	0	0	to	120	0	0
Arsenic, white, powdered	ton	59	0	0	to	60	0	0
Barium, carbonate, 92-94%	ton	13	0	0	to	14	0	0
Chloride	ton	23	0	0	to	24	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	16	10	0	to	17	0	0
Borax crystals	ton	39	0	0	to	40	0	0
Calcium acetate, grey	ton	23	0	0	to	25	0	0
Chloride	ton	8	10	0	to	9	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cobalt oxide, black	lb.	0	7	9	to	0	8	0
Copper sulphate	ton	40	0	0	to	41	0	0
Cream Tartar, 98-100%	ton	245	0	0	to	250	0	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde 40% vol.	ton	148	0	0	to	152	0	0
Iron perchloride	ton	32	0	0	to	34	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	83	0	0	to	85	0	0
Carbonate (White Lead)	ton	51	0	0	to	55	0	0
Nitrate	ton	58	0	0	to	59	0	0
Lithophone, 30%	ton	44	0	0	to	46	0	0
Magnesium chloride	ton	15	0	0	to	16	0	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	11	0	0	to	11	10	0
Sulphate (Druggists')	ton	17	10	0	to	18	0	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	0	11	6	to	0	12	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	100	0	0	to	102	0	0

	per	£	s.	d.		£	s.	d.
Potassium Chlorate	lb.	0	1	2	to	0	1	3
Meta-bisulphite, 50-52%	ton	224	0	0	to	240	0	0
Nitrate, refined	ton	58	0	0	to	60	0	0
Permanganate	lb.	0	3	3	to	0	3	6
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	1	9	to	0	1	10
Sulphate 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	0	0	to		—	
Seconds	cwt.	3	15	0	to		—	
Sodium acetate	ton	48	0	0	to	50	0	0
Arsenate, 45%	ton	50	0	0	to	52	0	0
Bicarbonate	ton	9	0	0	to	9	10	0
Bisulphite, 60-62%	ton	32	0	0	to	33	0	0
Chlorate	lb.	0	0	6	to	0	0	6½
Caustic, 70%	ton	23	10	0	to	24	10	0
Caustic, 76%	ton	24	10	0	to	25	10	0
Hyposulphite, commercial	ton	19	0	0	to	19	10	0
Nitrite, 96-98%	ton	58	0	0	to	60	0	0
Phosphate, crystal	ton	28	0	0	to	30	0	0
Prussiate	lb.	0	0	10¾	to	0	0	11¼
Sulphide, crystals	ton	16	0	0	to	16	10	0
Sulphide, solid, 60-62%	ton	22	10	0	to	23	10	0
Sulphite, crys[t].	ton	11	0	0	to	11	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
,, Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	38	0	0	to	40	0	0
Tin perchloride, 33%	lb.	0	2	4	to	0	2	5
,, Protochloride (tin crystals)	lb.	0	1	9	to	0	1	10
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Sulphate,	ton	21	10	0	to	23	0	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	6	to	0	2	9
Aniline oil, drums free	lb.	0	1	2	to	0	1	3
Aniline salts	lb.	0	1	5	to	0	1	6
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	6	6	to	0	7	0
Benzidine, base	lb.	0	6	6	to	0	7	0
Benzidine, sulphate	lb.	0	5	6	to	0	6	0
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	1	9	to	0	2	0
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	4	to	0	2	6
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Croceine Acid, 100% basis	lb.	0	4	9	to	0	5	0
Dichlorbenzol	lb	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	8	0
Dinitrobenzol	lb.	0	1	4	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	1	6	to	0	1	9
Dinitrotoluol	lb.	0	1	10	to	0	2	0
Dinitrophenol	lb.	0	1	3	to	0	1	6
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	11	6	to	0	12	0
Metaphenylenediamine	lb.	0	4	6	to	0	4	9
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	8	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthylamin-di-sulphonic acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	3
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	2	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor.	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	1	10	to	0	2	0
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	14	0	to	0	15	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	8	0	to	0	9	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	2	9	to	0	3	0
Salol	lb.	0	4	9	to	0	5	0
Shaeffer Acid, 100% basis	lb.	0	3	6	to	0	3	9
Sulphanilic acid, crude	lb.	0	1	3	to	0	1	6
Tolidine, base	lb.	0	9	0	to	0	10	0
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Alsation Potash Imports

We understand that the imports of Alsatian potash salts into the United Kingdom for August and September amounted to 2,576 tons, and up to the week ending October 18 3,113 tons. The prices are :—Sylvinite, 14 per cent. (French kainit), £7 per ton; Sylvinite, 20 per cent. (French potash salts), £8 7s. 5d.; Muriate of Potash, 80 per cent., £19 7s. 6d.

Chemical Matters in Parliament

German Potash Contracts

Sir Auckland Geddes, President of the Board of Trade, in reply to a question by Mr. R. B. Chadwick (House of Commons, October 22) said, only one contract for potash needed by the Government had been placed abroad by the Board of Trade since the Armistice to date. This was a contract entered into with the German Government representing an amount of £750,000. The contract was entered into in order to secure necessary supplies for the United Kingdom. It also provided a means whereby the German Government might pay for a portion of their imports of food.

No Royalties on Oil

Mr. Bonar Law (House of Commons, October 22), stated, in reply to a question, that the Government have come to the decision that no royalty shall be payable in the case of oil.

British Glassware Trade

During the past week the trade has been trying to complete the recovery from the effects of the strikes. The peril of a prolonged shortage of fuel has been already indicated, but the ironfounders' strike has also interrupted progress in mass production. In various parts of the country there are schemes ready for working out for mass production in mangin mirrors, all kinds of bottles, and cycle lamp lenses, and it is recognised that success will only come as a result of exceedingly high output. All bevelling tools for rough grinding are cast, and the prolongation of the moulders' strike has delayed the glass manufacturers considerably. These irritating interruptions are having a really serious effect on the trade, greatly delaying the efforts that are being made to catch up with the urgent requirements of the home market. That the foreigner was able before the war to take so much of the world's glass trade was a reflection on British enterprise, but indications are increasing almost daily of attempts that are being made by our manufacturers to wrest this position from him. Several of these instances have been referred to, and the most recent is the floating of a company for the manufacture of sheet and plate glass. It is scarcely conceivable that nearly all this glassware has hitherto come from abroad, but there are now signs that even that is coming to an end.—*Times Trade Supplement.*

Addressing a meeting in Dundee last week on co-partnership, Lord Leverhulme said that after nineteen years' experience of a co-partnership scheme, he felt there was a growing opposition to it on the part of the trades unions, although there was no opposition to it amongst the trades unionists who were inside the co-partnership. A feeling seemed to exist that co-partnership induced a something between the trade unionist and his organisation and a dread that it would weaken trade unionism. There was really no ground for the belief. We were drifting to all sorts of changes in our national system, which would be largely experimental. Nationalisation would be an experiment; and, once adopted, it would be one which, so far as he knew, it would be impossible to retract, and if that human sympathy between each of us was lacking there would be the greatest dangers to the State. He could not give them a system that would apply to every business; but if we had to meet the whole world in competition, as we knew we had to, there must be unity between employer and employed.

Company News

BURMA OIL.—The directors have declared interim dividends for the year 1919 on the first preference shares of £1 each, 7 1-5d. per share (equivalent to 6 per cent. per annum to June 30, 1919), less tax at 6s. in the £; on the second preference shares of £10 each, 6s. per share (equivalent to 6 per cent. per annum), less tax at 6s. in the £; on the ordinary shares of £1 each, 2s. per share (equivalent to 20 per cent. per annum), free of tax, payable November 7.

CENTRIFUGAL SEPARATORS (LTD.).—With reference to this company, which has just been registered with a capital of £275,000, it is stated that no public issue will be made, as the forthcoming issue of Ordinary "A" shares is being taken up privately. The company has been formed to take over the business carried on by the Hydraulic Separating and Grading Co. (Ltd.).

DALMELLINGTON IRON.—After providing for excess profit duty, coal mines excess profits and income-tax, the results for the year to June 30 show a profit of £46,446, and £5,297 was brought in, making £51,743. Deducting for depreciation and deferred repairs, £20,194, there remains a balance of £31,549. The Preference dividend and an interim dividend on the Ordinary of 3¾ per cent. have been paid; and it is proposed to pay a final dividend on Ordinary of 6s. 3d. per share, making 10 per cent. for the year, free of tax, carrying forward, £5,549.

EVANS, SONS, LESCHER & WEBB, LTD.—The company are inviting applications for 150,000 Ordinary shares of £1 each at a premium of 10s. per share. Formed in 1902 for the purpose of taking over the business of Evans, Sons & Co., Liverpool, and of Evans, Lescher & Webb, London, wholesale and export druggists, the company have an authorised capital of £750,000 divided into 450,000 5 per cent. Cumulative Preference shares of £1 each, and 300,000 Ordinary shares of £1 each. Messrs. Evans, Sons, Lescher & Webb are direct importers of drugs, manufacturers of pharmaceutical preparations and fine chemicals, distillers of essential oils, and manufacturers of and dealers in druggists' sundries.

HIGHLAND DISTILLERIES.—After setting aside £2,000 for depreciation, a dividend of 15 per cent., free of tax, is recommended for the year ended August 31 last, carrying forward £14,094 The distribution was 12½ per cent. for 1917-18, 15 per cent. for 19'6-17, 10 per cent. for 1915-16, and 5 per cent. for each of the five preceding years.

INTERNATIONAL NICKEL.—Quarterly dividend of 1¾ per cent. on preferred stock, payable November 1, to holders of record October 10.

JOHN LYSAGHT LTD.—For the purpose of facilitating registration the directors of John Lysaght, Ltd., have appointed a London registrar to deal with matters connected with transfers and share certificates of the ordinary shares. All transfers of ordinary shares should be presented at the office of Messrs. Cooper Brothers & Co., 14, George Street, Mansion House, E.C.4, between 11 a.m. and 3 p.m. (Saturdays excepted).

RATOCZYN (GALICIA) OIL CO.—The directors state that, owing to the dispersal of the clerical staff at the offices on the company's property during the war, it is impossible to submit the usual accounts. The material for their preparation has, fortunately, been preserved, and it has been arranged with the company's auditors to send one of their staff to Galicia to assist in preparing the accounts, which will be submitted to the shareholders in due course.

THE ANGLO-UNITED OILFIELDS (LTD.).—The prospectus states that the company has an authorised capital of £225,000, in Ordinary shares of £1 each, the present issue consisting of 160,000 shares at par. The company has been formed to acquire from the Lander Syndicate the entire stock of the Hudson Development Co. of Jersey City, which owns some 560 acres of oil-bearing lands situated in the "Henderson" Oilfield, forming part of the "Dallas" Oilfield in the State of Wyoming. The total purchase consideration will be £155,000, payable as to £90,000 in cash and as to the residue in shares. There will be available for the general purposes of the company £70,000, which, in the opinion of Mr. Campbell M. Hunter, is amply sufficient, after paying formation and other charges, to bring the oilfields into commercial production.

THE HAVANA OIL CO. (LTD.).—The directors announce the issue of 1,200,000 shares of 2s. each at 2s. 6d. per share. The company owns boring rights over a tract of territory situated in the Mariel district of Cuba, and having an area of approximately 5,000 acres. This area surrounds territories comprising about 1,000 acres owned by the Oil Trust (Ltd.), and in which are situated the asphalt mines which are being operated by that company. The company has entered into an agreement with the Oil Trust, under the terms of which it will acquire a licence to bore for oil over the trust's properties in Cuba. The consideration payable for the above licence is £45,000.

UNION COLD STORAGE.—The report for the year to December 31 last, shows an amount available of £304,654, as compared with £301,943 for 1917 and £253,388 for 1916. For the year 1918, out of earnings, there has been purchased and cancelled £53,610 debenture stock, also £12,150 has been paid off mortages on specific properties. After providing for debenture interest, dividend on the 6 per cent. preference shares, and dividend on the 10 per cent. "A" preference shares, there remains £81,066. The directors recommend the usual dividend of 10 per cent. per annum on the ordinary shares, leaving £51,066 to be carried forward, as compared with £45,454 brought in.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations Oct. 15.	Oct. 22
Alby United Carbide Factories, Lim., Ord.	1 1/16–1 1/16	1 1/32–1 3/32
Associated Portland Cement Manufrs. (1900.) Lim., Ord.	11–11½	11⅜ 11⅞
Bell's United Asbestos Co., Lim., Ord.	2⅛–2⅛xd	2 1/16–2 1/16xd
Bleachers' Association, Lim., Ord.	1⅝–1¾	1⅝–1¾
Borax Consolidated, Lim., Prefd. Ord.	4½–5	4½–5
Bradford Dyers' Assoc., Lim., Ord.	2 3/16–2 5/16	2⅛–2⅛
British Aluminium Co., Lim., Ord.	1 9/16–1 23/32	1¾–1⅞
British Oil and Cake Mills, Lim., Ord.	2⅜–2½	2 7/16–2 9/16
British Portland Cement Manufrs., Lim., Ord.	1 31/32–1 33/32	1⅝–1¾
Brunner, Mond & Co., Lim., Ord.	2⅛–2¼	2⅛–2⅛
Castner-Kellner Alkali Co., Lim.	2⅛–2⅜	2⅛–2⅜
China Clay Corporation, Lim., Ord.	¼–⅜	¼–⅜
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.	57–61	57–61
Courtaulds, Lim.	11–12	11–12
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce.	1 1/16–1 1/16	1 1/16–1 1/16
Curtis's & Harvey, Lim.	2 1/16–2 1/16	2 1/16–2 1/16
Electro Bleach and By-Products, Ltd., 7% Pref.	.. ..	.. ..
Explosives Trades, Lim., Ord.	19/6–20/6	20/6–21/6
Field (J. C & J.), Lim., Ord.	1¼–1⅜	1¼–1½
Greenwich Inlaid Linoleum (Fredk Walton's New Patents) Co., Lim., Ord.	31/32–1	11/16–12/16
Harrisons & Crosfield, Lim., 10% Cum. Prefd. Ord.	1 31/32–1 1/32	1⅜–1½
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.	16½–17¼	17–18
Lawes' Chemical Manure Co., Lim., Ord.	5¼–5½	5½–5¾
Lever Bros., Lim., 6 % Cum. "A" Pref.	19/9–20/3	20/1½20/10½
Do. 6½ % Cum. "B" Pref.	20/0–20/6	20/0–20/9
Magadi Soda Co., Lim., Ord.	1 1/32–1 1/32	1 1/16–1 1/16
Manganese Bronze and Brass Co., Lim., Ord.	11/16–12/16	11/16–12/16
Maypole Dairy Co., Lim., Defd. Ord.	1 1/16–1 1/16	1 1/16–1 1/16
Mond Nickel Co., Lim., 7% Cum. Pref.	1 1/16–1 3/16	1 1/16–1 3/16
Do. 7% Non. Cum. Pref.	1 1/16–1 1/16	1 1/16–1 1/16
Pacific Phosphate Co., Lim., Ord.	4⅞–5⅛	4⅞–5⅛
Power-Gas Corporation, Lim., Ord.	¾–⅞	¾–⅞
Price's Patent Candle Co., Lim.	90–95	90–95
Salt Union, Lim., Ord.	1 31/32–1 33/32	1⅛–1⅛
United Alkali Co., Lim., Ord.	1¼–1⅛	1¼–1⅛
Val de Travers Asphalte Paving Co., Lim.	1–1⅛	1–1⅛
Van den Berghs, Lim., Ord.	3⅛–3⅜	3⅜–3⅝
Walkers, Parker & Co., Lim.	1 3/16–1 5/16	1 3/16–1 5/16
Welsbach Light Co., Lim.	2–2¼	2 1/16–2 1/16

Gas, Iron, Coal and Steel

Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	40/3–41/3	38/6–39/6
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.	26/0–27/0	25/6–26/6
Gas Light and Coke Co., Ordinary Stock (4% Stand.)	58–61	58–61
Hadfield's, Limited, Ordinary	39/0–41/0	39/0–41/0
South Metropolitan Gas Co., Ordinary (4% Stand.)	58–61	58–61
Staveley Coal & Iron Co., Lim., Ord.	1⅝–1¾xd	1⅝–1¾xd
Vickers, Limited, Ordinary	35/3–36/3	34/6–35/6

Mines, Nitrate, &c.

Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	15½–16	15½–16
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.	88–93	88–93
Lagunas Nitrate Co., Lim.	1⅛–1⅜	1⅛–1⅜
Rio Tinto Co., Lim., Ord. (Bearer)	52–54	51–53
Tarapacá and Tocopilla Nitrate Co., Lim.	17/6–18/6	17/0–18/0

Oil and Rubber

Anglo-Java Rubber & Produce Co., Lim.	7/6–8/0	7/7½–8/1½
Anglo-Maikop Corporation, Ltd., Ord.	7/0–8/0	8/3–9/3
Anglo-Malay Rubber Co., Lim.	14/3–14/9xd	14/3–14/9
Anglo-Persian Oil Co., Lim., Cum. 6 % Part.	1 5/16–1⅜	1 3/32–1 1/16
Burmah Oil Co. Ltd., Ord.	14½–14¾	14¾–15
Chersonese (F.M.S.) Estates, Lim.	4/1½–4/4½	4/3–4/6
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	10 13/32–10 15/32	10 29/32–10 15/16
"Shell" Transport and Trading Co., Lim., Ord.	9 3/16–9 7/16	9⅛–9⅜
Do. 5% Cum. Pref.	9¼–9¼xd	9 5/16–9 5/16xd

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE.

Partnership Dissolved

PURVIS, Henry Hopkins, and Purvis, Albert Hopkins, colour grinders and white lead, oil and varnish merchants, 20 and 21, Greek Street, Soho, London, W.1, under the style of Hopkins Purvis & Sons, by mutual consent as and from December 31, 1918. All debts received and paid by Albert Hopkins Purvis.

Bankruptcy Information

HANLEY, James Alec, lately residing at Vesper Mount, Kirkstall, Leeds, but now of 5, Woodsley Terrace, Leeds, agricultural chemist. October 13. First meeting, October 28, 11 a.m. Official Receiver's offices, 24, Bond Street, Leeds. Public examination November 4, 11 a.m. Court House, Albion Place, Leeds.

Liquidator's Notice

LAWSPER BLEACHING CO., LTD.—A General Meeting will be held at 29, Princess Street, Manchester, on November 18, 1919, at 2.30 p.m. F. Selby Burman, Liquidator.

Company Winding up Voluntarily

WEAR PORTLAND CEMENT CO., LTD.—Mr. Herbert Salisbury Squance, of Sunderland, chartered accountant, appointed Liquidator. Wm. Sewell, Chairman.

Notice of Dividend

FAWN, Frederick Charles, 27, Claremont Road, Bishopston, Bristol, and trading at 348, Gloucester Road, Bristol, chemist. 17s. 7½d. First and final. October 27, Official Receiver's office, 26, Baldwin Street, Bristol.

Notice of Intended Dividend

GRIBBIN, William Henry, and UNSWORTH, Harold Austin, trading as Gribbin, Unsworth & Co., at 16, John Dalton Street, Manchester, engineers and chemical merchants. November 6. Trustee, A. Yearsley, 27, Brazennose Street, Manchester.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, created after July 1st, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

Satisfaction

ALSTON LIMESTONE CO., LTD., Alston.—Satisfaction registered October 11, for £1,000, part of £3,000, registered December 14, 1908.

Explosion at a T.N.T. Factory

In the Court of Appeal on Monday, the case of the Hooley Hill Rubber Co. *v.* the Royal Insurance Co., Ltd., and others, came on for hearing before Lord Justice Bankes, Lord Justice Scrutton and Lord Justice Duke.

Two interesting questions were raised in this case—an appeal from a decision of Mr. Justice Bailhache—first, whether in a fire policy containing a clause excepting damage caused by explosion the insurers were liable for damage caused by an explosion occurring incidentally in the course of the fire; and, secondly, whether in the case of the expression by the insurers' agent of his view on the legal construction of a policy containing such a clause which caused the assured not to cover themselves by taking out a further policy against loss by an explosion following a fire, the insurers were estopped from relying on the true legal effect of the clause.

The learned Judge answered both questions in the negative and decided in favour of the defendants.

The plaintiffs appealed and the Court dismissed the appeal on the first question, leaving the second question to be decided later on.

The facts of the case as found by the arbitrator (Mr. A. M. Langdon, K.C.) were that the plaintiff company manufactured T.N.T. at Ashton-under-Lyne on premises which they had built there for the purpose. They were insured under policies issued by the Royal Insurance Company and other companies. Condition 3 of the policy of the Royal Insurance Company provided :—

This policy does not cover . . . . loss or damage . . . . by explosion except loss or damage caused by explosion of illuminating gas elsewhere than on premises in which gas is manufactured or stored.

A similar condition was contained in the other companies' policies. On the margin of the Royal Insurance policy was a typewritten memorandum as follows :—

This policy does not cover loss or damage by explosion nor loss or damage by fire following any explosion, unless it be proved that such a fire was not caused, directly or indirectly thereby, or was not the result thereof.

On June 13, 1917, a fire broke out in the plaintiffs' works and did great damage; then an explosion took place which shattered the premises; a quantity of T.N.T. was exposed to the intense heat of the fire, causing the explosion. The loss sustained by the assured up to the time of the explosion was assessed at £12,740. This claim was admitted by the insurance companies. But the loss sustained by reason of the explosion was contested on the ground that the conditions of the policies exempted them from that liability. The arbitrator on the two questions stated above found in favour of the insurers, and the assured appealed to the Judge, who upheld his decision, and the plaintiffs again appealed.

Lord Justice Bankes said that the point discussed before the Court was undoubtedly an important one. Each company had different forms of policy, but the language used was not materially different, and the memorandum indorsed on the Royal Insurance policy had reference to liability of the insurance companies in case of explosion and was supplemental to the conditions. The contention of the assured was that the contract of insurance was one of indemnity and that the general rule ought to be applied—namely, that in considering the case the proximate cause, or, as it had been called, the dominant or efficient cause, must be looked at, and that, if that was done, the fire was the proximate cause of the loss. On the other hand, it was said that the general principle was not disputed, but that there was another principle—that the parties might, by their contract, exclude that rule, and that, in this case, the rule had been excluded in express and unambiguous language. To decide this question it was necessary to bear in mind that the contracts were entered into by parties who contemplated that fire might cause damage to the property covered by the policies, and that, consequently, the use of the word "explosion" showed that the explosion must be one causing a fire or one following on a fire. An explosion not following on a fire or caused by fire was not contemplated by the parties.

His Lordship, after reading the condition and memorandum, said that the language of the memorandum indicated more plainly that the parties contemplated the exclusion of cases of explosion, because they expressly excluded liability for damage by fire following an explosion, unless the fire was caused by the explosion. If the matter had to be determined merely in the policy, he would have been prepared to hold that any loss following an explosion was not covered by the policy, but there was also authority for that view in Stanley *v.* Western Insurance Company (L.R. 3 Ex. 71), which had been acted on by the arbitrator and the Judge. Mr. Hogg had asked the Court to say that that case was wrongly decided. His Lordship then referred to various passages in the judgments in that case and said that even if he disagreed with the views expressed, and he did not, he would hesitate to differ from a decision which had not been questioned for something like fifty years.

Lord Justice Scrutton and Lord Justice Duke agreed.

Some discussion then took place as to the consideration of the second question, and ultimately by consent of the parties the appeals against the other insurance companies were dismissed, with costs, and the second question stood over for a week for argument.

Unsuccessful Claim for Compensation

In the Bow County Court, on Wednesday, before Judge Graham, K.C., sitting with Dr. Bate as medical referee, application was made under the Workmen's Compensation Act by G. D. Turner, of 8, Bingley Road, Custom House, for an award against Messrs. Abram Lyle & Sons, sugar refiners, of Silvertown. On July 4 the applicant was charging iron pipes with char, when there was an explosion, and some hot acid and char splashed into his face. He was badly burned, and some of the acid and char went into his eyes. The applicant was paid 25s. a week to July 30, when the money was stopped. He had not been able to work since, and his right eye was so bad that everything was a blur. Dr. Crowley agreed that the lad was not fit to go back to work.

For the defence Dr. Toogood said he did not believe a word the lad had said about his sight. He was fit to go back to work amongst chemicals in July, and was more fit now. He did not consider that acid on the eyelid would hurt the eye, as the eyelid was there to protect the eye.

Dr. Bate examined the lad, and after a consultation with His Honour, Judge Graham decided that he could have worked at the end of July, and found for the respondents, with costs.

The Affairs of C. T. Hoare

The affairs of Cyril Thornton Hoare, 235, Knightsbridge, S.W., who partly attributed his insolvency to his failure to obtain a Government contract for the supply of a new varnish, came before Mr. Registrar Francke at the London Bankruptcy Court on October 17, upon the adjourned hearing of his application to approve a proposal providing for the payment to creditors of a cash composition of 6s. 8d. in the £. The failure occurred on April 2 last, and the application originally came before the Court on August 19, the total ranking liabilities in the

opinion of the Official Receiver being £3,171. Apart from the Court fees it is considered that a sum of £1,135 will be required to pay the composition. Counsel for the debtor said that his client was not in a position to proceed with the proposal owing to the fact that certain contingent liabilities which it was thought would be dealt with by another party had not been dealt with owing to the appearance of the latter in the Bankruptcy Court. Under the circumstances he requested permission to withdraw the application with a view to his making another one at a later stage. The Official Receiver offered no objection to such a course, and his Honour thereupon allowed the application to be withdrawn.

China Clay Corporation

On behalf of Mr. H. Mallaby-Deeley, M.P., one of the trustees of a debenture trust deed securing the stock of the China Clay Corporation, Ltd., Mr. Galbraith, K.C., moved before Mr. Justice Sargant in the Chancery Division this week for the appointment of a receiver and manager of the assets of the company.

Counsel said the other trustee was Sir C. A. Hanson, and he and the plaintiff were also directors, and Sir Charles was a defendant in the action. The company had got into difficulties, £500 was due for rent, and in August, 1919, the company, owing to its financial difficulties had practically to close its operations, though steps had been taken to keep the premises open, the company having sold 3,000 tons of clay, the sale of which in normal times would take thirty weeks to complete. In these circumstances the company passed a resolution that, for the protection of the interests of the company, Mr. Mallaby-Deeley should be asked to start proceedings for the security of the debenture-holders, he being the holder of £20,838 stock.

Counsel for the company and for Sir Charles Hanson assented to the motion, and his lordship appointed a receiver and manager of the assets of the company.

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